THE ILLUMINATING ENGINEER

LIGHT
LAMPS
FITTINGS
AND
ILLUMINATION

THE JOURNAL OF

GOOD LIGHTING

Official Organ of the Illuminating Engineering Society

FOUNDED IN LONDON 1908

Edited by
LEON GASTER

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GAS
ELECTRICITY
ACETYLENE
PETROL-AIR
GAS
ETC.

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Special Features:

The B.E.S.A. Standard Specification for Street Lighting—The Meeting of the International Commission on Illumination at Bellagio—Motor Car Headlight Problems—A National Gas Conference—Report of H.M. Chief Inspector of Factories for 1926—News from Abroad—Correspondence, etc.

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The B.E.S.A. Standard Specification for Street Lighting

THE final version of the B.E.S.A. Specification has now made its appearance, and we give a summary of its contents on page 320. It will be recalled that this specification formed the subject of one of the chief papers read at the Conference of the Institution of Public Lighting Engineers in September, which was reported in our last number. It was also very fully discussed early this year before the Illuminating Engineering Society and other bodies interested. These discussions have proved very useful. The presentation of the specification for criticism before its issue in final form was a judicious plan which will no doubt be adopted in dealing with other debatable subjects in the future. The chief modifications resulting from discussions include the addition of an extra class, "H," having a rated mean test-point illumination of 0.01 foot-candle, and intended for residential and open streets where through traffic is not ordinarily expected; and the modification of the apparently mandatory character of the glare clause. Other changes are mainly concerned with phrasing and the elucidation of various clauses where some danger of confusion seemed to exist.

The discussions already reported in this journal have doubtless served to make the contents of the specification fairly familiar to readers, and its chief terms are now generally familiar. The main clauses are simple and readily grasped, and the conditions of testing are clearly specified. The two most important items are the classification of streets by illumination, and the minimum heights prescribed for each class. The classification is not unlike that originally proposed in the well-known paper read by Mr. Trotter before the Illuminating Engineering Society in 1913. The range is, however, wider. Some are inclined to think that the first class, "A" (minimum 2 foot-candles) goes beyond what is immediately practicable, and others regard the low minimum illumination associated with class "H" (0.01 foot-candle) as hardly worth specifying. No doubt we shall in practice be concerned mainly with the intermediate classes. The series of minimum heights, from 13 feet upwards, is a useful departure which should help considerably towards elimination of glare.

Discussion centred very largely on the procedure in dealing with glare, one of the chief criticisms being that the formulæ take no account of the use of diffusing glassware (although an implicit recognition of the value of such glassware in diminishing glare is afforded by the statement that when diffusing globes are used the minimum heights may be modified by consent of the parties interested). The method of obtaining the glare factor is inevitably somewhat complex, and is admittedly an experimental device.

In view of the issue of the specification considerable interest attaches to the report of the Street Lighting Committee of the Illuminating Engineering Society (U.S.A.), which reviews procedure in various countries. Through the courtesy of Prof. F. C. Caldwell, one of the members of this committee, we have received a summary of the report, which will appear in our next issue. In some respects there is close agreement with procedure in this country. We notice, however, that the minimum recommended height is 15 feet, and that the classification is based on average and not on minimum illumination. Very instructive is the effort to assess numerically the various requisites in street lighting so that, by addition, streets can be arranged in approximate order of merit.

The whole subject is a particularly useful one for international discussion. Whilst each country will settle details of procedure, agreement on general principles should be attainable. Meantime, as Mr. Cramb pointed out in his address before the Institution of Public Lighting Engineers, our aim in this country should be to make as full use as possible of the specification now available; for it is only by actual experience of its working that debatable points can be settled and imperfections remedied. Whilst we have described this as the "final" form of the specification it is of course recognized that modifications may become necessary as the result of further experience. One of the first steps that we should like to see carried into effect is the equipment of model installations throughout a fair length of street showing the actual effect of compliance with the requirements for the different classes. Such experimental demonstrations could no doubt be arranged in leading provincial cities, and they would help very considerably in enabling public-lighting engineers and street-lighting authorities to appreciate the actual results of applying the specification in practice.

International Developments in Illumination

IN our last issue we commented upon some of the chief features in the conference of delegates to the International Illumination Commission at Bellagio. In this number we are giving a somewhat fuller account of the proceedings. Readers will doubtless be interested in the review of the conference kindly contributed by Dr. N. A. Halbertsma, whilst in our correspondence columns will be found a communication from an observer abroad offering some constructive criticism on the manner in which such conferences are conducted. We feel sure that these suggestions will receive sympathetic consideration at headquarters. The problems are similar to those experienced at most international gatherings, where it is becoming increasingly difficult to discuss adequately the large number of papers and reports presented. Equally important is the question—referred to in our last issue—of giving publicity to the work of the International Illumination Commission. In this case it is particularly important that the conclusions arrived at should become as widely known as possible. This journal will continue to act as a centre of information from all countries, and the account of the proceedings published in this issue, whilst necessarily condensed, will no doubt be found to be the most complete one appearing in the technical press. The conference at Bellagio will also have the useful result of adding considerably to the number of corresponding members of the Illuminating Engineering Society, and through them we hope to obtain much interesting information on developments abroad.

Meantime we may note several other gatherings which will receive attention shortly. There is, for instance, the series of papers read at the annual meeting of the Illuminating Engineering Society in Germany, noted on page 304. On this occasion the idea of arranging a series of papers covering one specific aspect of illumination was again followed. The papers on the opening day were all concerned with the relation of illumination to health and efficiency, both medical men and lighting experts contributing. On the second day such matters as the lighting of docks and harbours, ships' navigation lights, lighthouses and beacons, etc., were discussed, the choice of this series of subjects being specially appropriate in view of the fact of the meeting being held in Hamburg, one of the chief ports in Germany.

Finally, we have the very comprehensive series of papers read at the Twenty-First Annual Convention of the Illuminating Engineering Society in the United States, which took place on the shores of Lake Michigan during October 11th to 14th. The list of papers reproduced on page 310 will serve to show the wide ground covered, and we propose to deal with these more fully in coming issues. It will be noted that many of the papers deal with subjects that are also receiving attention in this country. The report of progress is, as usual, a very comprehensive one, and the report of the Committee on Street Lighting is naturally of special interest at the present moment, when we in this country are occupied with the standard specification.

On this occasion—as in the case of the Annual Meeting of the German Illuminating Engineering Society, referred to above—the method of arranging papers in groups dealing with allied aspects of illumination was followed. Thus the opening group of communications was concerned with daylight, ultra-violet rays, colour problems, etc., and the final section was concerned with the lighting of railways and the use of light as an aid to aerial navigation.

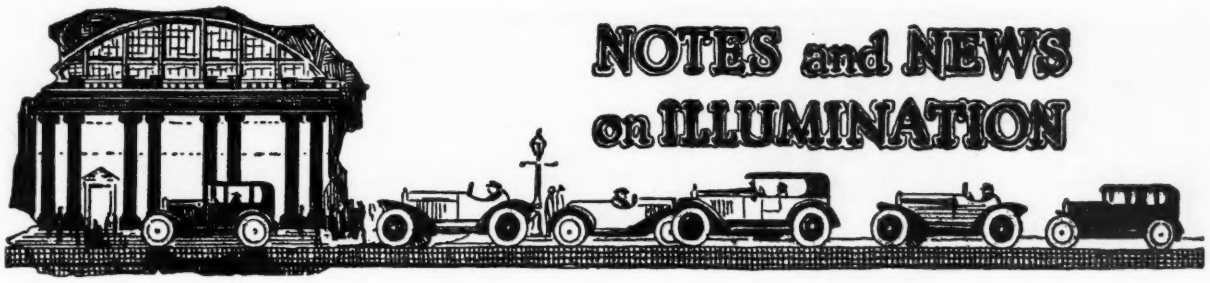
The Motor Headlight Problem

THE motor-headlight problem received a considerable amount of attention during the conference of the International Commission on Illumination at Bellagio. We have previously recorded one of the chief conclusions—that in the case of passing cars it is better not to "dim" the headlights by merely reducing the candle-power, but to adopt instead some form of depressed beam, such as that involving the use of the dual filament device. At one time the question whether headlights should be "dimmed" in passing an approaching car was the subject of much controversy in the press. The dimming naturally diminished the glare in the eyes of the approaching driver; but the sudden reduction in the beam was regarded as a somewhat hazardous step, as it diminished the illumination ahead at the very moment when clear vision of the road was most necessary. So far as can be judged at present a simple device for producing a momentarily depressed beam is much more satisfactory. The glare from the upper rays is thus diminished, but at the same time the illumination on the section of the road immediately in front of the car is not reduced, but may even be increased by the change. The dual beam system is therefore finding favour on the Continent, and, more recently, in the United States as well.

This problem, however, forms only a small part of the whole general question. Its complexity was illustrated by the two instructive papers presented respectively by Mr. L. B. W. Jolley and Dr. J. W. T. Walsh. Mr. Jolley contended that true standardization involves the elimination of all focussing devices and the introduction of an international standard of divergence of beam, with suitable tolerances. The problem is not merely to design the best form of headlight. It is equally important to ensure that the original conditions are maintained. Practically all anti-dazzle devices depend for their action on accurate focussing. Yet in practice motorists are notoriously lax in this respect. Mr. Jolley quoted from a recent survey of 200 cars in America, only 5 per cent. of which were found to have their beams horizontal.

Dr. Walsh's paper was concerned with the problem of specifying the beam characteristics desirable for maximum visibility. The analysis of this problem led to a number of useful conclusions, but the most novel point suggested was doubtless the provision of projectors giving a coloured beam in a rearward direction. It is obvious that, as this projector is so much nearer the road surface than the headlight of an approaching car, quite a strong road illumination could thus be obtained, and the source would be invisible to an approaching driver. It would of course be necessary to ensure that the projector does not cause glare to drivers behind the car, and coloration of the beam (red or amber) is necessary to prevent confusion with the headlights of approaching cars.

The two papers contain much interesting and suggestive information. The problem they attempt to deal with—the requirements when two cars are meeting and passing—is one of the most important in road traffic. But there are other aspects, such as the effect of glare from headlights on the eyes of pedestrians, that should also be borne in mind. In this issue it has only been possible to give a very brief account of the two papers, and we would like to suggest that they should be reserved for full discussion at a joint meeting of the Illuminating Engineering Society and the leading bodies concerned with motor transport.



Foggy Weather and the Colour of Daylight

In the early part of last month Londoners had an opportunity of judging the effect of fog on the quality of daylight. Even in London fogs in the early part of October are unusual; and the darkness was rendered more tantalizing by the knowledge that people a few miles out of London were enjoying brilliant sunshine. One striking feature was the local nature of the fog. In some areas it was so dark as to necessitate artificial light at midday, in others its effect was relatively small. A curious point noticed by the writer was the marked yellow coloration of the transmitted light in some areas where the mist was not dense. It was observed that the light from gasfilled lamps in shop windows matched almost exactly the natural light from the sky. This is but an illustration of the extraordinary variations in the colour of daylight, especially in smoky cities. In judging the correctness of artificial daylight apparatus it must be remembered that industrial cities rarely enjoy "normal" daylight. Even when there is a white sky and a clear atmosphere the presence of dust and smoke in the atmosphere gives a distinct yellowish tinge to the light.

Hotel Lighting

A recent contributor to *Electricity* comments somewhat disparagingly on the lighting of the average hotel in this country. The lighting of the public rooms, he suggests, is usually not too bad, and the restaurants in better-class hotels are, on the whole, suitably illuminated. But when it comes to the bedrooms—what horrors! The usual thing is a long 30-watt lamp and a short shade of the mid-Victorian period hanging over the dreary dressing-table at the window. Very often there is no bedside switch. Some hotels, in a spirit of magnificence, place a 20-watt lamp over the dressing-table and a similar lamp over the bed. (In such cases, however, the proprietor not infrequently arranges alternative switching, so that both lights cannot be on at once.) Our contemporary remarks that in Continental hotels the lighting of bedrooms is usually better done, and this is confirmed by opinions that we have received from other quarters. In Continental hotels of fair class it is the usual thing to provide a lamp at the bedside—though the proprietor probably pays as much, and possibly more, for his electricity than in this country. The low standard of bedroom lighting is probably partly the result of want of thought, partly of the deep-seated impression that artificial lighting is pre-eminently a field for economy. Certainly there seems room for an educational movement in this direction.

The First Arc Lamp Installed by a Municipality

It is stated that the first arc lamp to be installed by a municipal authority, at least in the United States, was at Wabash, Indiana, 47 years ago. Thousands of people assembled to see night turned into day. It is strange to read to-day of the exaggerated impressions formed regarding the effect of this light on the stimulation of plant life. "Farmers within a radius of five miles were led to believe that they would have corn large enough to harvest with saws." In this respect public expectations were not fulfilled. But apparently the illumination of the square was in itself sufficiently impressive. "People stood overwhelmed with awe. Men fell on their knees, groans were uttered at sight, and many were struck dumb with amazement."

Why Light the Streets at All?

The provision of street lighting is commonly the result of a compromise between those who desire the best possible illumination and those who advocate minimum expenditure. But, according to *Municipal Engineering*, it has been left to members of the Ballycastle Urban District Council to consider the problem on a somewhat more radical basis. The chairman propounded the conundrum: "Why should we light the streets at all?" To this a member of the Council made reply: "Then what are the ratepayers paying for? What became of the money that was saved on the street lighting last year? The town was only lit up half the season, and still the ratepayers had to pay the full rate. Why should they be asked to pay for a thing they were not getting?" —a fairly obvious retort. It was finally decided, after a lengthy exchange of pleasantries, to appoint a committee to confer with the local electricity supply company with a view to arriving at an arrangement.

Street Lighting at the Public Works Congress

A varied programme has been arranged for the Public Works, Roads and Transport Congress, which is to be held at the Agricultural Hall during November 14th to 19th.

The proceedings on the morning of the opening day (November 15th) will be of special interest. Under the auspices of the Incorporated Municipal Electrical Association and the Institute of Gas Engineers, a paper entitled "Street Lighting regarded as an Illumination Problem" will be read by Dr. J. W. T. Walsh (National Physical Laboratory), whilst Mr. W. J. Jones (E.L.M.A. Lighting Service Bureau) will deal with "Street Lighting in London." We understand that the former paper, by Dr. Walsh, was awarded the second prize (silver medal and £25) in the open competition organized by the Papers Committee of the Congress.

The Institution of Gas Engineers is also co-operating in the afternoon session of the opening day, when a paper by Mr. F. W. Goodenough, entitled "How the Gas Industry Can Assist Smoke Abatement" will be read.

The Language of the Advertiser

Some pregnant remarks on the choice of language in technical advertisements are made in a recent issue of *Licht und Lampe*. Attention is drawn to the vague phraseology of many advertisements and to the use of commercial jargon (of which the use of that overworked expression "the same" is a conspicuous example). A special protest is made against the habit of linking together with "and" several sentences which have nothing whatever to do with each other. Engineers and technical men have often been blamed for their imperfect mastery of composition, and inability to present data in a lucid and impressive form. But in technical advertising a good style is exceptionally important. This does not mean that the language should be pedantic, or even that which would be appropriate in a book or treatise. It may be terse and colloquial, and should "tell the tale" clearly and simply with a minimum of words.

Illuminating Engineering Society in Germany

ANNUAL MEETING.

The annual meeting of the Illuminating Engineering Society, held in Hamburg during September 30th to October 1st, was noteworthy for the allocation of two days to discussions of special subjects. The papers on the opening day were all devoted to the relation between illumination and health and efficiency. Professor Dr. Holtzman delivered an address on injuries to health caused by bad lighting, and Dr. Schütz dealt with the essentials of good lighting from the standpoint of the medical profession. Herr Schneider's contribution dealt mainly with the relation between illumination and efficiency and the technical basis of standards of proper lighting. In the afternoon there were two papers dealing primarily with the eye. Dr. Thies discussed possible injuries arising through exposure of the eye to radiation (ultra-violet rays, etc.), and Dr. Bloch explained the action of protective glasses. Thus an opportunity was afforded for the exchange of views between lighting experts and medical men, with a view to closer future co-operation. The same method was applied to the second day's discussion. The meeting being held in Hamburg, a shipping city, it was appropriate that the discussions should deal with such matters as the lighting of docks and harbours, the visibility of navigation lights, and the design of lighthouses and beacons. Papers on these subjects were read by Herr Wundram (an architect), Dr. Burath and Herr Jädicke. The discussion was followed by a tour round the port and a trip to the Blankensee. All those who have any recollection of Hamburg will recognize that this must have been an enjoyable gathering.

Good Illumination and the Handling of Rolling Stock

The important part played by lighting on the railways is becoming increasingly recognized. The public is familiar with its possibilities at terminal stations, both in assisting the motions of passengers and in giving intimations of the arrival and departure of trains, etc. On crowded routes light plays a valuable part in assisting passenger traffic. But railway men are finding that abundant light helps to speed up all railway processes. An interesting statement to this effect was recently made at a meeting of a railway club, reported in *The Electrical World*. An official stated: "For efficient operations we are strong on light. It speeds up everybody. Everyone will work better under good lighting than in semi-darkness. We used to think that if we switched 500 cars in the daytime we could expect the night fellow to get away with only about 350 cars. We expect just as much now of our night men as we do of our day men, and we generally get it. This is brought about by proper lighting and clearing up the yard. Good lighting also keeps away thieves. We are able to reduce the number of watchmen in a big yard 50 per cent. by providing plenty of light."

It is useful to have this testimony from the United States as to the value of good lighting on railways. We have no doubt that engineers associated with leading railway systems in this country would confirm its value in expediting the handling of traffic.

High Candle-power Flame Arc Lighting in Leipzig

A correspondent sends us some particulars of a striking installation, now being put up in one of the main squares at Leipzig. Long-burning flame arcs, mounted four on a column, are to be used, and each lamp will take now no less than 30 amperes, and will therefore give a candle-power much in excess of that derived from any other single lamp at present used for street lighting. The lamps, being of such high candle-power, will naturally require to be mounted at a considerable height and the posts will accordingly be 30 metres (90 feet) high. We understand that these posts are being constructed out of a special concrete composition designed to imitate red marble. This seems to be a striking example of the tendency on the Continent to illuminate large outdoor areas by means of very high candle-powers on tall masts. The installation at the Brandenburg Thor in Berlin will be recalled as another instance of such methods.

English and Metric Units in Illuminating Engineering

A contribution to *Licht und Lampe* by Dr. Halbertsma points out the inconvenience of two systems of units—the metric and the English in illuminating engineering. It was formerly believed that the metric system would be ultimately adopted in all countries. This expectation has not been realized. Actually the "English" system has become more widespread than ever. It forms the basis of many of the leading industries, and it is only in electrical work, which, being of later growth, presented less difficulties in the alteration of existing standards, that the adoption of the metric system has made progress. (Thus the kilowatt-hour is used for the unit of electrical energy, and wireless wavelengths are measured in metres, and not in yards or miles.) In illuminating engineering the existence of two distinct systems, based on the foot and the metre, is particularly confusing. A recommendation of 10 to 20 foot-candles in printing works appears in a recent German translation as 10 to 20 lux! It is important that foreign units should be understood, and values converted into the units of the countries concerned. The coining of new terms, in the attempt to reproduce foreign units (e.g., "Fusskerze" as a translation of "foot-candles") is not to be recommended, and only adds to the confusion.

Light as an Aid to the Destruction of Pests

According to *The Electrical World*, tests of the attraction of light for insect pests have recently been made by the State Experiment Station at Geneva, New York. It was found that "tent caterpillars," among the most ravenous of all insect pests, would invariably desert succulent young apple figs and gather about an electric lamp in places where there is plenty of light and little fodder. The experiment was extended to the study of light of different colours. Apple branches were arranged radially from a central point towards lamps of different colours. Apparently hungry caterpillars usually made a bee-line for pale yellow lamps; some preferred a deeper yellow, but red light appealed only to a few. This interesting effect may have applications in horticulture. Possibly in the nurseries of the future selected coloured lamps wired above valuable plants may take the place of such familiar expedients as the exposure of slips of potato, etc.

TECHNICAL SECTION

COMPRISING

Transactions of The Illuminating Engineering Society and Special Articles

The Illuminating Engineering Society is not, as a body, responsible for the opinions expressed by individual authors or speakers.

The International Commission on Illumination

Its History, Aims and Objects

IN the following pages it is proposed to give a general account of the gathering of the delegates to the International Commission on Illumination, held at Bellagio (Italy) during August 31st to September 4th.

But before doing so it may be well to present a brief account of the origin of the Commission and its aims and objects (based on the official report that has now been prepared). The present Commission may be said to have originated in the International Photometric Commission, which was the outcome of a resolution passed at a congress of members of the gas industry held at the Paris Exposition of 1900. The need for definite information on the illuminating power of light sources in the interests both of consumers and manufacturers was recognized, and it was hoped that the Commission would help in establishing definite rules to be followed in making photometric observations.

The International Photometric Commission.—The first meeting of the Commission was held in Zurich in 1903. Nine countries participated. Useful papers were read and some important decisions were taken. In particular the problem of comparing light sources of different colours attracted attention.

At the next meeting, held in Zurich in 1907, valuable papers were again presented. The National Laboratories in the various countries were encouraged to investigate the possibility of establishing a standard of light based on the use of molten platinum. Another matter that had already attracted attention was the need for agreement on nomenclature, and at this meeting agreement was reached on a number of symbols for international use. Work was resumed at the next Congress in 1911, one important decision being that relating to the assessing of quality of gas in terms of calorific value.

These meetings of the old International Photometric Commission thus helped to pave the way for the work of the International Commission on Illumination, and especially for the agreement reached in 1909 on the "international candle" and the relation thereto of the Hefner unit (equal to 0.9 international candle).

Formation of the International Commission on Illumination.—As a result of a resolution from Great Britain, passed at the Electrotechnical Congress in Turin in 1911, and the subsequent action of the American Gas Institution in proposing the extension of the Photometric Commission, it was decided to widen its scope and constitution so as to include the electrical interests, by the formation of a new Commission—the International Commission on Illumination. The co-operation of Dr. E. P. Hyde was of great value in carrying this proposal into effect.

A resolution to this effect was moved by Mr. L. Gaster, Hon. Secretary of the Illuminating Engineering Society in Great Britain, and seconded by Dr. C. H. Sharp and Dr. A. E. Kenelly, and was carried unanimously. In 1913, at a meeting in Berlin, the new basis of the "International Commission on Illumination" was agreed upon. The statutes now include the following statement of the objects of the Commission: "The study of all matters bearing on illumination and its cognate sciences, and the establishment by appropriate means of international agreements on illumination matters."

Meetings in Paris (1921) *and Geneva* (1924).—The work of the Commission was unavoidably interrupted by the events of the next few years, and it was not until 1921 that the next meeting was held in Paris. At this meeting the definition of the unit of luminous intensity was confirmed, in terms of agreed values of candle-power of certain electric lamps kept at the National Laboratories. Various fundamental definitions were also agreed upon, and technical committees were appointed to study various subjects, including factory and school lighting, heterochromatic photometry, automobile headlights, definitions and symbols. At Geneva, in 1924, this work was continued, and twenty-nine papers of considerable technical interest were read.

The Meeting at Bellagio (1927).—The gathering just held at Bellagio was noteworthy for the fact that all the countries affiliated to the Commission, including the ex-enemy nations, were represented. Delegates were welcomed by the Podesta of Bellagio and by Professor Bordoni, who expressed the gratification felt by the Italian Committee that this meeting synchronized with the commemoration of their great countryman, Volta. The address of the President (Dr. E. P. Hyde) contained a graceful allusion to the centenary of Volta, and to the hospitable welcome that delegates had received. He outlined the chief functions of the Commission—which should act as a kind of International Illuminating Engineering Society concerned with every aspect of lighting problems. "It should be a forum where new ideas as to theory and practice might be presented and discussed. It should be a clearing house for national differences of nomenclature and standards. It should be a legislative assembly where the broad underlying principles of safety lighting, efficiency lighting, automobile, street and school lighting might be established—fundamental principles which might serve as bases for national codes adapted to the needs and conditions peculiar to each country. It should be a university of enlightenment in all that pertains to the science of lighting; a publicity department for the propagation of correct lighting principles, a bureau of ideas and methods of correct lighting practice. And it should be an important link in the chain of international conventions which promote lasting goodwill and amity among the peoples of the earth."

On the next page will be found an account of general impressions of the Conference, kindly contributed by Dr. N. A. Halbertsma, and in subsequent pages the work of the committees and the various papers read are dealt with in fuller detail.

Some Impressions of the International Commission on Illumination

(Held at Bellagio, Italy, August 31st—September 3rd, 1927)

By Dr. N. A. HALBERTSMA

THE light of a radiant sun and the purest blue of the Italian sky floods the flowered banks of beautiful Lake Como and the ripples of its emerald water. Doubtless they mean to remind the delegates from ten countries, in most of which summer has proved a complete failure from a meteorological point of view, that natural daylight had not yet lost anything of its charms, and that banks of cloud can only temporarily distract from the enjoyment of one of the most beautiful gifts which have come to mankind.

This session of the International Commission on Illumination, for which a hearty invitation had been sent out by the Italian National Committee on Lighting and Heating, was attended by delegates from Germany and Austria for the first time since the war. This shows that the clouds which have for so many years been throwing their shadows on the international work of the above Commission have now entirely disappeared. Thus the full radiance of a sun of mutual understanding aiding scientific and technical progress in the field of illumination can shine on this session and render its work successful.

Since the last meeting of the I.C.I. at Geneva, in 1924, Japan, Germany Austria, Holland and Belgium had joined the I.C.I., and the Union of Soviet Republics sent one of their most prominent representatives of electrical science, Professor Chatelain, as an observer. With the delegates of the former members of the I.C.I.—the United States, France, Great Britain, Italy and Switzerland—these 50 representatives of the National Commissions on Illumination formed in the above-mentioned countries represent all the chief illuminating engineering interests.

The International Illumination Commission being organized at a more recent date (1913) than the corresponding electro-technical organization (the International Electrical Commission) has not yet reached its full complement of 28 member-countries, but it includes those countries in which illuminating engineering is in a most progressive state.

The work of the Commission aims specially at mutual agreement on those subjects where a uniform solution all the world over is desirable. The first of such items is the unit of light. It is a most regrettable state of affairs that there still exist two units of light (the "international candle" and the "Heffner" candle) which differ only by 11 per cent., and that there is no uniformity as to the methods of their reproduction.

Both are arbitrary units, and there is a strong desire on all sides to relate the reproduction on the unit of light to certain dimensions and phenomena which are invariable—e.g., the temperature of melting platinum in its purest state. Similar efforts have been made, e.g., to relate the unit of length to the wavelength of the characteristic yellow light of a flame containing sodium. Professor Janet, of France, reported on progress in the development of a black-body radiator, the temperature of which has been determined by the melting-point of gold and palladium. Similar work is being carried on in the National Physical Laboratories of Germany, Great Britain and the U.S.A., and there is no doubt that mutual interchange of experience will soon lead to the adoption of a standardized method and thus put the unit of light on a solid scientific basis.

Another problem of international importance is the lighting of factories and schoolrooms. The conservation of eyesight of children and workers is in itself a valuable national asset, but its study should also lead ultimately to international standardization of lighting codes and regulations. Mr. L. B. Marks, of New York, whose wide experience in this respect is well known, presided over the meetings of this Commission, which were also attended by Dr. Carozzi, of the Bureau International du Travail at Geneva. Delegates were much impressed by the account, presented by Mr. L. Gaster, of the methods pursued by the Illumination Research Committee in Great Britain, and by the useful series of researches which this Committee has already conducted.

In view of the growing use of motor-cars for international traffic, uniformity in regulations for headlights of automobiles is also badly needed. The International Conference on Motor Car Traffic, held in Paris in 1926, has adopted the principle of reducing the glare when cars meet on the road. It is a big step, however, from the adoption of this principle to finding a satisfactory solution for the enforcing of the idea. Dr. Sharp, of New York, chairman of the Commission on Automobile Headlights, and other members reported on the rapid headway made by the "depressible beam" system, which, in its simplest form, can be realized without undue expense by the use of double-filament lamps in the headlights. Reducing the amount of light from the standard headlights by dimming was generally regarded as a risky method. In order to make the interesting reports from Germany, Great Britain, the U.S.A., France and Holland available to the public, and notably to the Government and police authorities, car manufacturers and makers of headlights, it was decided to combine them into a booklet which will fully illustrate the present status of this art.

Other committees discussed the subjects of symbols and definitions of the photometry of light of different colours, and of an international vocabulary of lighting terms. Mr. C. C. Paterson, Director of the Research Laboratories of the General Electric Co. Ltd., in London, was elected President. The merits of the retiring President, Dr. E. P. Hyde, were warmly eulogized at the meeting and at the various social functions. These social functions were organized with the greatest success by the Italian National Committee, which proved its ability not only to furnish valuable contributors (important papers were amongst others submitted by Prof. Bordoni, Ing. Peri, Ing. Clerici and Ing. Danesi), but also acted as charming hosts.

The interesting and enjoyable days of Bellagio now belong to the past. The national committees will now have to embark forthwith on a number of new problems which will form the subject of the next meeting. Dr. Sharp, on behalf of the U.S.A. National Committee, extended a highly appreciated invitation to the I.C.I. to hold that meeting in the U.S.A. in the autumn of 1928. "Illumination by Daylight," "Street Lighting," "Classification of Various Coloured and Signal Glasses," "Kinema Lighting," "Photometric Testplates," "Light Flux Distribution," and "The Accuracy of Photometric Methods" are amongst the new subjects, each of which has been assigned to one of the national committees for study and report.

Ex Oriente lux!

Light comes from the East, but in September, 1928, we may expect it will shine strongly from the West.

Illuminating Engineering Society

(Founded in London, 1909).

Opening Meeting—November 22nd, 1927

The Opening Meeting of the Illuminating Engineering Society will be held, by kind invitation, at the E.L.M.A. Lighting Service Bureau (15, Savoy Street, Strand, London, W.C.) at 7 p.m. on Tuesday, November 22nd.

This opening meeting will as usual be devoted to the presentation of Reports of Progress (including a Review of Progress during the Vacation, by Mr. L. Gaster, and the Report of the Committee on Progress in Electric Lamps and Lighting Appliances), and the exhibition of novelties in connection with Illumination and Photometry, etc.

Any members who desire to exhibit new forms of lighting fittings, instruments or apparatus or to present descriptions of interesting new installations, etc., are invited to communicate with the Hon. Secretary (Mr. L. Gaster, 32, Victoria St., Westminster, London, S.W.1).

The International Commission on Illumination

Proceedings at the Meeting held in Bellagio (Italy), Aug. 31st to Sept. 4th, 1927

Work of Committees.

The number of subjects allocated for consideration by committees has increased very rapidly, and the following subjects have been selected as requiring immediate attention:—

(1) Vocabulary, (2) definitions and symbols, (3) factory and school lighting, (4) automobile headlights, (5) heterochromatic photometry, (6) street lighting, (7) signal glasses, (8) diffusing materials, (9) photometric test plates, (10) accuracy of photometry, (11) light-flux distribution, (12) daylight illumination, (13) cinema lighting, (14) fundamental researches on glare, and (15) colorimetry.

The work of these committees is of considerable importance. The agreement already reached in regard to definitions, symbols, etc., has already proved useful. A vocabulary of terms in use in different languages is now being prepared.

On such matters as the lighting of schools and factories, automobile headlights, etc., exchange of views between representatives of different countries is particularly desirable. The co-operation of ophthalmologists is necessary in view of the relation of "glare" to these problems. In both cases different countries have their own methods; but exchange of opinions should nevertheless lead ultimately to the acceptance of common principles on which recommendations applicable to the respective countries may be based.

Amongst the committees only recently formed may be mentioned those on street lighting, signal glasses, diffusing materials, photometric accuracy, daylight illumination, cinema lighting, and fundamental researches on glare. On many of these subjects much remains to be done, and in some cases (e.g., daylight illumination) an attempt to present the results of existing research in a concrete form, readily applicable in practice, would be very welcome.

Attention may be drawn to the new arrangement whereby National Committees are asked to take charge of one or more special subjects, thus acting as a "secretary" and collecting information for headquarters. In this way it is hoped to bring these subjects as closely as possible to the stage of international agreement before each plenary session of the Commission. Valuable preparatory work, paving the way for international decisions, might thus be done.

One other important consideration is obviously the publicity given to proceedings at sessions of the Commission. In all such cases the task is twofold—firstly, to initiate the researches and assemble results; secondly, to make these results as widely known as possible. The second part of the work is at least as important as the first, but is apt to be overlooked. It is therefore satisfactory to learn that the Commission is giving special thought to this question, and one of the first fruits of their deliberations is the issue of an official report, summarizing the aims of the Commission and the chief work so far accomplished.

Papers and Communications.

Forty-six papers and communications in all were presented, all the chief countries being represented. In the field of photometry special interest attaches to a contribution from France dealing with the standard of light based on the incandescent black body. The following papers on photometric subjects, all emanating from the United States, may also be noted: "Results of Practical Experience in Photoelectric Photometry" (W. F. Little and C. E. Horn); "Further Developments in Photoelectric Photometry" (C. H. Sharp and H. A. Smith); "Photometry and Watt Measurements of Incandescent Lamps on Ordinary A.C. Circuits (C. H. Sharp and E. D. Doyle). Contributions from Italy reviewing recent progress in photometry were also submitted.

Comments from the U.S.A., Great Britain, Italy and France discussed certain recommendations for the advancement of the work of the Commission. From Great Britain the various B.E.S.A. specifications dealing with portable photometers, industrial reflector fittings, street-lighting and tungsten filament lamps, and the British glossary of terms used in photometry were presented. There was quite a series of communications from R. Bordoni (Italy), C. Clerici (Italy), A. Blondel (France), Ch. Fabry (France) and others dealing with symbols and definitions.

Numerous papers reviewed progress in framing recommendations and standards for general lighting. C. Clerici surveyed general progress in Italy. G. Peri (Italy) discussed street lighting, in which connection the 1927 report of the U.S.A. Committee on Street Lighting was also presented. Progress in the lighting of schools and factories was dealt with by U. Bordoni (Italy), W. Wissmann (Germany), L. Gaster (Great Britain) and others. Contributions from France and Italy also discussed recommendations on illumination in general terms.

Next we may record a series of communications from L. B. Jolley and J. W. T. Walsh (Great Britain), P. Bossu (France), and from Germany and Holland reviewing progress in the study of glare from motor headlights and the regulations made on this subject in the respective countries. Finally, there were papers submitted to the Heterochromatic Photometry Committee by R. Jouast and P. Wagnet (France), W. Dziobek and M. Pirani (Germany), and others.

The "Black Body" Standard of Light.—The communication presented on this subject by M. Janet recalled the account of researches in this field submitted by M. Fleury at Geneva in 1924. M. Fleury's researches have since been continued by three leading physical laboratories in France, in co-operation with the Institut d'Optique.

The black body originally utilized by M. Fleury was maintained at a temperature of about 2,075° K., which was approximately that of the carbon filaments, which served as actual secondary standards. It has since been thought desirable to aim at a black body temperature such as to give a light of the same colour as that emitted by vacuum tungsten-filament lamps, which are now utilized as standards in the Laboratoire Central d'Electricité. M. Fleury estimated that the temperature would be of the order of 2,340° K., and that the corresponding brightness would be about 260 candles per square centimetre. It is proposed to continue the work by determining the relation between brightness and temperature when the black body is operated to give a light identical with that of vacuum tungsten lamps. The researches of Ribaud and Nikitine, at the University of Strassbourg, who utilize spirals of molybdenum as a black body, maintained at the temperature of melting palladium, are also being closely followed. One point that requires careful study is the effect of impurities on the melting point of the metal used. It has also been suggested that a method of control proposed in 1894 by Lummer and Kurlbaum might be revived. This method is based on the relation of the co-efficient of absorption of some suitable material to the temperature; it appears possible to obtain curves connecting this co-efficient with the brightness secured.

Developments in School and Industrial Lighting in England.—In his paper on "Developments in School and Industrial Lighting in England," Mr. L. Gaster recalled that he had submitted a review of progress in this field at the meeting of the Commission in Geneva in 1924. On that occasion the distinction between the organization of schools abroad and in this country was emphasized. In England many schools are controlled by private enterprise, whereas on the Continent the educational system is under the control of the State. Hence in England it is less easy to frame regulations for universal application. There is a general view that higher values of illumination might now be recommended. Dr. J. Kerr, in a recent paper before the Illuminating

Engineering Society (London), suggested 5–10 foot-candles, as compared with the minimum of 2–3 proposed by the Joint Committee formed by this Society in 1913. The Board of Education is understood to be devoting attention to this subject, which is also being dealt with by the Joint Committee formed by the Medical Officers of Schools Association to consider standard classrooms for primary and secondary schools.

On the other hand, regulations affecting the lighting of factories in Great Britain would apply to the whole country. Reports of H.M. Chief Inspectors of Factories reveal a decided improvement in industrial lighting generally, and this is doubtless largely the result of consultations with the chief Industrial Councils. Meantime the Bill for consolidating and amending the Factory Act contains three clauses providing sufficient and suitable lighting in general terms, and empowering the Secretary of State, by special order, to prescribe standards for any class of factories.

Mr. Gaster recalled that the third report of the Home Office Departmental Committee on Lighting in Factories and Workshops contained a schedule of "fine" operations (requiring not less than 3 foot-candles) and "very fine" processes (requiring not less than 5 foot-candles). Many managers of factories would, in their own interests, desire higher illuminations, and there is a general tendency to distinguish between legal minima and recommendations.

In the next section of his paper Mr. Gaster gave an account of the work of the Illumination Research Committee, working under the Department of Scientific and Industrial Research, referring specially to the report on "The Relation between Illumination and Efficiency of Fine Work" (typesetting by hand).

The report mentioned above is an important example of a research, conducted on impartial lines, in order to trace the relation between illumination and efficiency of work. The committee was very fortunate in receiving the co-operation of the Joint Industrial Council for the Printing Trades of the United Kingdom. The chief result of the investigation was the discovery that full efficiency in typesetting by hand is only attained with an illumination of the order of 20 to 25 foot-candles. Other aspects of the problem, such as the relative merits of direct and indirect lighting, "artificial daylight," etc., are still being examined.

This is only one of many problems being investigated by the Illumination Research Committee, which it is hoped will extend its enquiries to other industrial operations. Meantime it is probable that the results in this case would apply broadly to many other forms of fine work. Amongst other developments of interest the forthcoming opening of the Industrial Museum, established in London in connection with the Home Office, was mentioned. This museum will show every form of safety appliance in operation, and will also contain exhibits illustrating the principles of good lighting in factories. In conclusion attention was drawn to the tendency towards standardization in illuminating engineering, as illustrated by the work of the various committees operating under the British Engineering Standards Association, and particularly by the specification of industrial reflectors.

Mr. Gaster pointed out how, in the arrangement of these various committees, overlapping of work was avoided and how the Illuminating Engineering Society, which is represented in all the bodies mentioned, acts as a "liaison officer" and serves a useful purpose in co-ordinating researches and acting as a clearing house for information.

Delegates present expressed considerable interest in the methods of treating industrial lighting in this country, and there was a general recognition that the principles, resulting in somewhat gradual but thorough development, were sound.

The Automobile Headlight Problem.—A useful paper on "The Automobile Headlight Problem" was presented by Mr. L. B. W. Jolley, who pointed out that this problem resolved itself into a compromise between a good driving light and a non-glaring source. The minimum beam requirements should be ascertained by experiment on the road for each country. The decision as to what constitutes a glaring source is one of considerable complexity, owing to the many variable factors which include (1) the initial setting of the headlight, (2) the loading of the car, and (3) the effects of hills, corners, and unevenness of road surface. Devices enabling headlights to be swivelled automatically have been proposed, but appear inadvisable. The best that may be expected is that manufacturers should fix the headlight in such a way that it is correct once and for all, and cannot be further adjusted by the motorist.

The programme of research should aim at ascertaining (1) a good minimum driving light at a maximum speed to be determined, (2) the maximum illumination on the eye of (*a*) the pedestrian and (*b*) the drivers of oncoming vehicles, which may be considered innocuous under conditions of road traffic, and (3) the design of a headlight to meet with requirements (1) and (2).

Much difference of opinion exists on (1) and (2), on which (3) is naturally dependent. But immediate progress in one direction appears possible—the elimination of all focussing devices and the introduction of an international standard of divergence and beam with suitable tolerances. The paper attempts to show how this idea can be developed.

Standard divergence implies a beam which tends to a divergence of so many degrees, and which fills a given target with a specified and allowed tolerance when any lamp is placed in any reflector. A standard beam may be defined in terms of a given polar curve of distribution of luminous intensity. This may be effected by using a target, which implies the imposition of tolerances in luminous intensity of the lamp as well as the supply voltage. The author proceeds to discuss the importance of standardized divergence, pointing out the vital effect of focussing on all kinds of anti-dazzle devices. In view of the carelessness of the motoring public in the handling of optical devices the importance of eliminating all adjustments, however trivial, is realized. The first step in obtaining standardized divergence is to secure that the major part of the filament is always on the one side or the other of the focal point, preferably in front of it, when all tolerances of manufacture of both lamp and reflector are combined. The next point is to fix the standard divergence and the minimum departure allowable. If manufacturing tolerances can be reduced to a lower figure than those required for beam divergence, then standardized divergence is assured. It has long been felt that this is the fundamental requirement of all forms of headlight projection. This point has been avoided mainly because, owing to the provision of focussing devices, there has been no need for anyone to attempt to reduce tolerance on manufacture.

The author next considers in turn the effect of a point source, a line source, a disc source, the filament towards or away from the apex, etc., and the procedure to be followed in the design of lamps and reflectors. In Great Britain there are only two types of filament generally employed, the axial and the V-spiral. A preference is expressed for deep reflectors; V-filaments used with such reflectors do not adversely affect standardization.

In conclusion, it is pointed out that all anti-dazzle devices depend for their action on the accurate alignment of the projector. Yet, in a recent survey of 200 cars in America, 81 per cent. were found to be tilted downwards, 14 per cent. were tilted upwards, and only 5 per cent. had their beams horizontal. Although inaccuracies in loading, variations in the level of the road surface, etc., render alignment inaccurate, that is no reason why correct alignment should not be aimed at, and a plea is made for the greatest possible accuracy in fixing headlights rigidly, so that they cannot be tampered with by the public. Although the international standards of divergence and beam do not constitute a complete solution of the problem, they might serve to reduce the present annoyance so considerably that no other legislative action would be required. It would give the assurance that the vagaries of the source itself are controlled, even though the source itself may be misdirected.

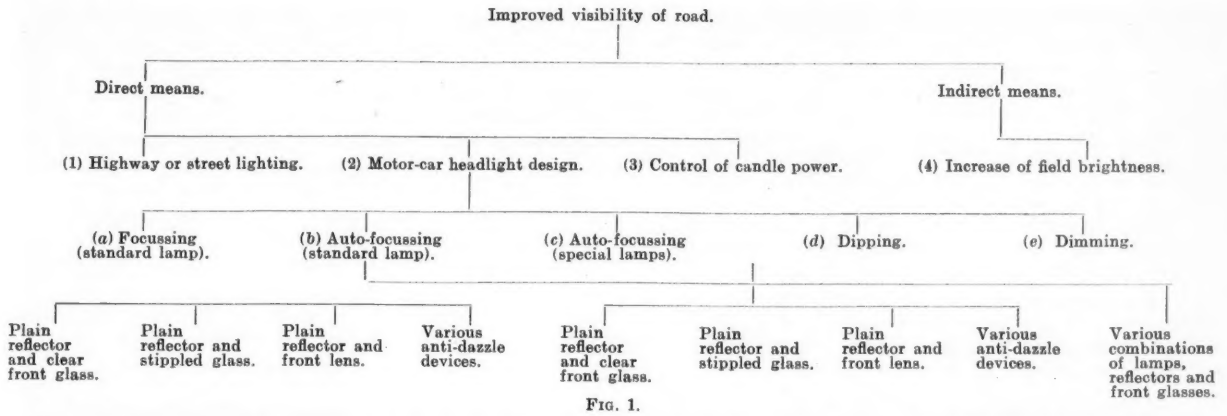


FIG. 1.

In the accompanying diagram we reproduce an ingenious method adopted by the author to illustrate the chief features of headlight design and how they contribute to the visibility of the road.

The Reduction of Glare from Automobile Headlights.—This question was dealt with in a comprehensive paper by Mr. J. W. T. Walsh, which may be regarded as supplementary to that by Mr. L. B. W. Jolley, referred to above.

The paper is devoted mainly to an attempt to state a method of defining the beam characteristics of a motor-car headlight so as to obtain maximum visibility of objects on the off side of the vehicle. The author applies data obtained by Holladay assessing the reduction of the contrast sensitivity of the eye, caused by glaring sources of light in the field of view. In the final section of the paper a novel suggestion is made, namely, that vehicles should be provided with projectors giving a coloured beam of light in the rearward direction, so as to illuminate the off side of the road behind them for a short distance. This would probably help in securing adequate visibility on the road when vehicles are passing one another.

Mr. Jolley's paper, referred to above, deals with the provision of a beam of standard initial distribution. It is now proposed to consider the second requirement, i.e., the conditions to be satisfied by the beam after it has passed through the optical or other device designed to give the required result.

Reference is made to the specification for beam distribution issued by the Illuminating Engineering Society of New York in 1918. This assumed that headlights were of the fixed type (i.e., no "dipping" of the beam—either by mechanical tilt of the headlights or by the aid of some optical device under the control of the driver). In France, however, the "dipping" device has been much favoured, and there has lately been a tendency to introduce this type of anti-dazzle device in this country and in America.

At a speed of 40 miles per hour a distance of 150 feet is covered in about 2½ seconds, so that the beam should be powerful enough to show up objects at distances at least as great as this. If an illumination of 0.5 foot-candle is produced at this distance this means a total candle-power of 11,250, or at least 6,000 candle-power from each headlight. This candle-power is needed from the horizontal downwards for about 2° and sideways for an angle sufficient to cover the road, say 3°, on either side of the right-ahead direction. There is no reason why candle-power should be limited in directions below the horizontal, since it is only the rising light that causes glare.

Many headlights now on the road yield an axial candle-power of 30,000 or more. It is mainly when passing oncoming cars that glare becomes dangerous.

In the subsequent section of the paper the author discusses the conditions of maximum visibility and its calculation, under certain definite assumptions, and also the visibility with different distances between the two cars about to meet. For maximum safety on the road every vehicle should be equipped with headlights of the "passing" type, but in the case of vehicles intended for fast driving on clear roads headlights of a more powerful type with unrestricted beam illumination may be desired. Such special headlights should, however, be put out of action before an oncoming vehicle has approached within, say, 150 yards. Evidently a headlight would have to be very carefull designed to comply with both sets of conditions. The ingenuity of inventors should be applied to the development of a method of support for the headlight which shall render the direction of the beam axis as independent as possible of the car loading. Evidently a change in the slope of the roadway has a similar effect; there seems to be no way of overcoming this particular difficulty, and only a reduction in speed can give the same degree of safety as is obtained under normal conditions.

The idea of providing a rearward illumination has apparently never been given a trial under practical road conditions. If every vehicle were provided at the rear with a projector giving, say, 1,000 candle-power in a rearward direction, slightly inclined toward the off side of the road, all objects at a distance up to 50 feet behind the vehicle would be so brightly illuminated as to be picked up readily by the driver of the approaching car. It is, however, necessary to avoid confusion between such a rear light and the headlights of approaching vehicles, and this can be done by the use of colour. Glasses giving a satisfactory red coloration and yet transmitting at least 25 per cent of light could easily be provided; hence, in order to furnish, say, 1,000 candle-power, only 4,000 axial candle-power would be required from the headlight unscreened. Almost immediately after the oncoming vehicle has passed this rearward illumination could be extinguished. This system of overcoming the glare problem is less sensitive to the tilt of the vehicle, due to loading or change in road slope, than the ordinary method.

From the foregoing analysis the author draws the following main conclusions:—

(1) When a vehicle is on the road, the higher the candle-power of the headlights the better the visibility.

(2) When vehicles are meeting a specified minimum visibility may be secured by having:—

(*a*) A specified minimum value of the axial candle-power for the headlights of all vehicles.

(*b*) A specified maximum candle-power in a given direction or region in the off-side upper quadrant. This direction is that of the eye of the driver of an approaching vehicle at a given distance. The ratio of the two values of candle-power should be as small as possible, but it cannot possibly be reduced below 0.1, since the angle between the directions in which these candle-powers are emitted is very small.

(*c*) A specified maximum value for the mounting height of headlights, and a specified minimum for the height of the driver's seat. By this means a certain minimum value is secured for the height of the driver's eye above the level of the approaching vehicle-lights.

(3) The value of the minimum axial candle-power should be as great as possible, consistent with the requirement that headlights giving this axial candle-power must be carried by all vehicles (or all vehicles of a given class or liable to travel at more than a certain speed).

(4) If a driver wishes to have a more powerful light than that allowable under (2), in order to secure better visibility on a clear road, two sets of lights may be carried. One set is then unrestricted in candle-power, but must be put out when within a specified distance of a vehicle approaching from the opposite direction. The other set must conform with the requirements of (2) and must be used when meeting another vehicle. Alternatively it may be possible to combine both types of beam in a single headlight by the use of a special form of dipping device. The ordinary dipping beam does not produce the results specified.

(5) If a suitable projector be fitted to the back of a vehicle so as to illuminate objects to the rear, the ratio of candle-powers described in (2) may be very materially increased, say to 0.3. This projector may give a beam of distinctive colour, red or amber, and is for use only when meeting other vehicles. The effect of uneven loading is much less for this system than for the system described in (2), and it might prove possible, by the use of suitably designed rearward projectors, to avoid the use of a restricted headlight beam altogether. More experiment on this matter is needed, however, before it is possible to decide this definitely.

Some Other Papers and Communications.—Amongst other communications and papers we may note a useful summary of principles of illumination presented by the Swiss National Committee. The suggestions for working illumination seem to be generally similar to those followed in this country, 40 lux being recommended for rough work, 60 lux for reading and writing, and 100 lux (approximately 10 foot-candles) for very fine work. It is interesting to note that the limiting brightness of sources beyond which glare becomes sufficient to demand screening is put at 0.7 candles per square centimetre (roughly 3 to 4 candles per square inch); the angle of inclination, within which lights should be screened, is 30°—the same as that adopted in this country.

A summary of regulations in Germany relating to automobile headlights was also presented. The principles on which the classification of headlights is determined are settled by the authorities in consultation with representatives of the motor industry and the Illuminating Engineering Society. Special reference is made to the recently introduced dual-filament device, whereby either a powerful unrestricted beam, or a more subdued beam for use in passing other vehicles, may be secured.

Illuminating Engineering Society (U.S.A.)

Twenty-First Annual Convention

THE twenty-first Annual Convention of the Illuminating Engineering Society was held during October 11th to 14th on the shore of Lake Michigan. We have already received advance copies of some of the series of reports and papers read, with which we hope to deal in subsequent issues.

Meantime a general survey of these items may be given. After the opening day (October 10th) had been devoted to meetings of Council and committees, the Convention proper was opened on Tuesday by an address of welcome by Mr. John F. Gilchrist. This was followed by the President's Address, delivered by Prof. H. H. Higbie, and the usual report of the Committee on Progress, presented by Mr. F. E. Cady. The report of the 1927 Committee on Street Lighting was presented by Mr. P. S. Millar.

A list of papers follows. It will be seen that they cover a wide ground. Some of the items were handled in a popular manner, so as to prove of interest to Convention guests as well as members:

Tuesday, October 11th:—

Light Distribution Requirements for Asymmetric Ornamental Street-lighting Units; by T. W. Rolph and A. J. Sweet.

Variation in Natural Illumination; by J. E. Ives.

A Preliminary Report on the Measurement of Variation of Energy in the "Vita Spectrum" of Sunshine in Kansas; by J. S. Hughes.

Spectral Characteristics of Light Sources and Window Materials used in Light Therapy; by W. W. Coblentz.

Colour Classification of Natural and Artificial Illuminants; by Norman Macbeth.

Hot Cathode Discharge in Neon; by J. D. Forny and C. G. Found.

Wednesday, October 12th:—

A Simplified Lighting Code for Factory Inspectors; by S. G. Hibben.

Technique of Economic Studies of Lighting in Industry; by J. W. Barker.

Symposium on Office Lighting; directed by G. H. Stickney.

Demonstration of Rating Scheme for Residence Luminaires; by Ward Harrison.

Improved Design for Stage-lighting Equipment; by A. W. C. Brown and F. M. Falge.

Light for Ornament; by A. L. Powell.

Adapting Period Designs to Modern Illuminants; by M. Luckiesh.

Thursday, October 13th:—

LIGHTING SERVICE COMMITTEE SESSION.

Lighting Practice, Past, Present and Future; by James E. Davidson.

Discussion on Light Service Manual.

Report of Committee on Sales Aids (J. M. Hickerson).

Report of Committee on Campaigns (H. W. Derry).

Report of Committee on Records and Reports (J. C. Fisher).

PARALLEL LABORATORY SESSION.

Standardization of Methods of Heterochromatic Photometry; by A. H. Taylor.

Photometry and Watt Measurements of Incandescent Lamps on Ordinary A.C. Circuits; by C. H. Sharp and E. D. Doyle.

A Photo-electric Cell Photometer; by C. Deshler and H. Schroeder.

Results of Practical Experience in Photo-electric Photometry; by W. F. Litle and C. E. Horn.

Further Developments in Photo-electric Photometers; by C. H. Sharp and A. H. Smith.

JOINT SESSION WITH NATIONAL COMMITTEE FOR PREVENTION OF BLINDNESS.

Intensity of Light and Speed of Vision, with special reference to Industrial Situations; by C. E. Ferree and Gertrude Rand.

Four Fundamental Factors in Vision; by P. W. Cobb and F. K. Moss.

How We Learn to See and How We Learn Some Other Things; by W. T. Bovis.

Friday, October 14th:—

Railroad Yard Lighting; by H. E. Mahan and R. J. Swackhamer.

Lighting of Airports and Airways; by Hon. W. P. McCracken, junr.

The Present Status of Lighting for Aviation; by P. R. Bassett, R. W. Cost, E. A. Leinroth and H. C. Ritchie.

Daylighting in Multi-Story Industrial Buildings; by Andrew Vogel, Frank Benford, W. C. Randall and A. H. Martin.

(*For conclusion of Technical Section see p.* 320.)

POPULAR & TRADE SECTION

COMPRISING

Installation Topics—Hygiene and Safety—Data for Contractors—Hints to Consumers

(The matter in this section does not form part of the official Transactions of the Illuminating Engineering Society; and is based on outside contributions.)

Street Lighting

HISTORICAL.—With the growth of civilization there has been a consistent demand for public lighting, and as early as A.D. 378 street lighting was installed in some parts of Antioch. Throughout the Middle Ages there was an incessant demand for public lighting in this country in the principal cities, but 1415 is the date of the first serious attempt in London, due to the exhortations of the Lord Mayor. Little progress was made, however, until 1736, when street lighting of the City of London was put out to contract, but it was not until the introduction of gas lighting for the purpose of street lighting (1809 Pall Mall, 1813 Westminster Bridge) that any great progress was made. Since then arc lamps and incandescent electric lamps have successfully been employed, but although progress has been continuous the increase in the standards of illumination that are considered to be adequate have far outpaced any progress that has been made. The question of street lighting is obviously a complex one, since it has, in these days of rapidly moving traffic, to fill a number of special purposes.

General.—The greater speed and volume of traffic imposes greater responsibilities upon those who have to deal with street lighting, and it is a regrettable fact that insufficient attention has been given to street lighting as a whole in this country. The number of street accidents is still on the increase, and there is ample evidence that many of these accidents could be avoided by effective illumination.

Responsibility.—There is a definite lack, in this country, of co-ordination between various street-lighting authorities, and this is one of the reasons why street lighting is, in general, in such a chaotic condition. It is common to find some streets well lighted, while others adjacent, since they come under the control of a separate authority, are poorly lighted. The use of different forms of illuminants still further complicates matters, and, above all, the appropriation for street lighting out of Borough Council funds is totally inadequate. The present appropriations are far too low, and an investigation of the average rate allotted to public lighting revealed that it is generally only a few pence in the pound, while that of maintaining the roads is 18d. to 20d. in the pound. It should be remembered that bad street lighting limits the use of an otherwise good road, and, what is more, the allocation from council funds for public lighting purposes is often less than that allowed for public washhouses and libraries. Expenditure of money on street lighting is fully justified, not only for the facilities afforded to traffic but for the better protection of property.

Police Requirements.—The police authorities point out that darkness harbours crime, and sufficient street lighting should therefore be provided to facilitate police supervision at night time. In some instances it has been found advisable to provide more light than is ordinarily required purely on the score of protection from burglary, etc.

General Public.—Street lighting should give reasonable facilities for the public to be able to read numbers on doors and to see obstacles in the street, while in the case of shopping districts street lighting will create a brighter atmosphere. In some instances, where the architectural features of buildings deserve special attention, good results can only be obtained by co-operation between the lighting engineer and the architect.

Motorists' Point of View.—The motorist desires particularly to be able to see the road surface clearly at a considerable distance, and the London Safety-First Committee has recommended that there shall be sufficient street lighting to enable a person or object of a substantial size to be seen at a distance of 100 feet. This obviously involves considerably higher values of illumination than are at present available. A number of street-lighting authorities have arranged for warning signs to be lighted up in special lanterns, while it is possible that a system of traffic signalling will be of greater importance in the near future.

Hours of Lighting.—In large cities, where street repairs, cleaning and all night traffic are in operation, all-night services are required, involving a total of 4,380 burning hours per annum. A dusk-to-midnight service involves 2,185 hours per annum. It should be borne in mind that from a central station point of view an all-night service of street lighting has a 50 per cent. load factor throughout the year.

Classification of Roads and Streets.—It is quite obvious that street lighting should be graded according to the main purpose of the thoroughfare, and it is suggested that a committee, consisting of the police and Ministry of Transport, shall take this general matter in hand.

The illumination from one type of system to another should be graded in order to prevent inconvenience caused by suddenly coming from an area which is poorly lighted and proceeding into an area that is the reverse.

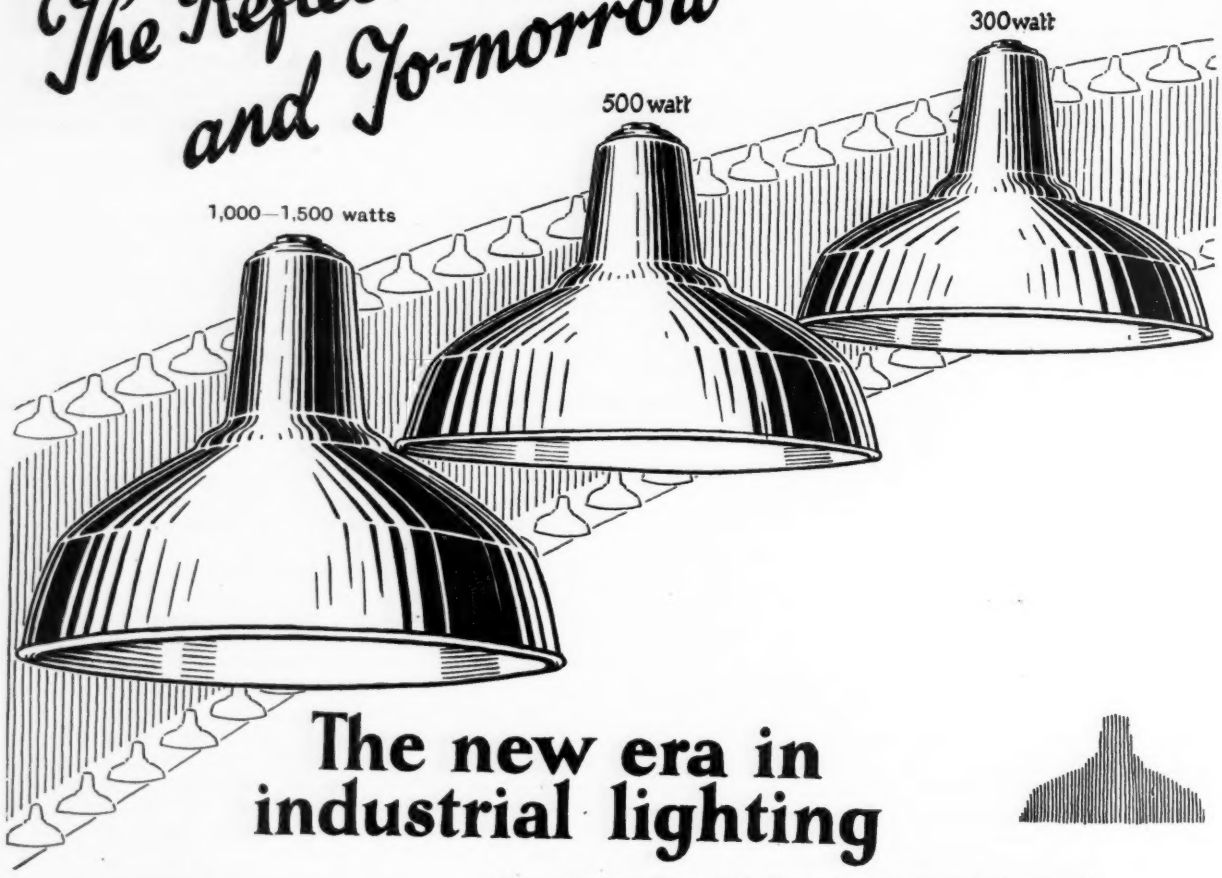
Visibility.—The most important criterion of street lighting is that of visibility, and in general the method of seeing an object in the street is rather more complex than under ordinary conditions. It is seldom that the object is sufficiently lighted so that direct visibility is obtained, and in the majority of cases the object is only seen by contrast and silhouette. In very important thoroughfares, such as Oxford Street and the Strand, objects are seen by direct lighting, but even during the daytime an object in the street appears dark compared with the background. Visibility should be equally maintained throughout the length of the street, and excessive changes of intensity of illumination must be avoided.

Glare.—Glare is one of the greatest evils in present-day street lighting, and much must be done in order to mitigate its effect, and it is for this reason that in many instances units are being mounted at considerable heights from the ground.

(*Continued on p.* 314.)

BENJAMIN ONE PIECE REFLECTOR

The Reflector of To-day and To-morrow

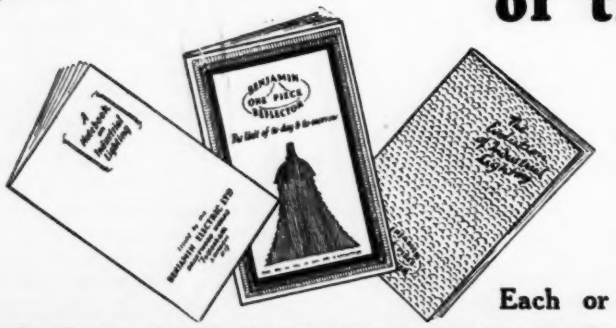


The new era in industrial lighting

The vitreous Enamelled Benjamin ONE PIECE R.L.M. Reflector is an improvement in industrial lighting second only to that due to the progress in the manufacture of electric lamps. It conforms to all standard requirements and will meet practically all conditions of industrial lighting.

To quote the *ELECTRICAL REVIEW*—"A user of the standardised R.L.M. Reflector would know that he was taking no risks." Already scientifically perfect, this Benjamin Reflector is now mechanically perfect by being made in one piece. No alteration in price.

Have you had one of these Booklets?



The Benjamin Electric, Ltd., have issued three publications dealing with their new ONE PIECE R.L.M. Reflector:—

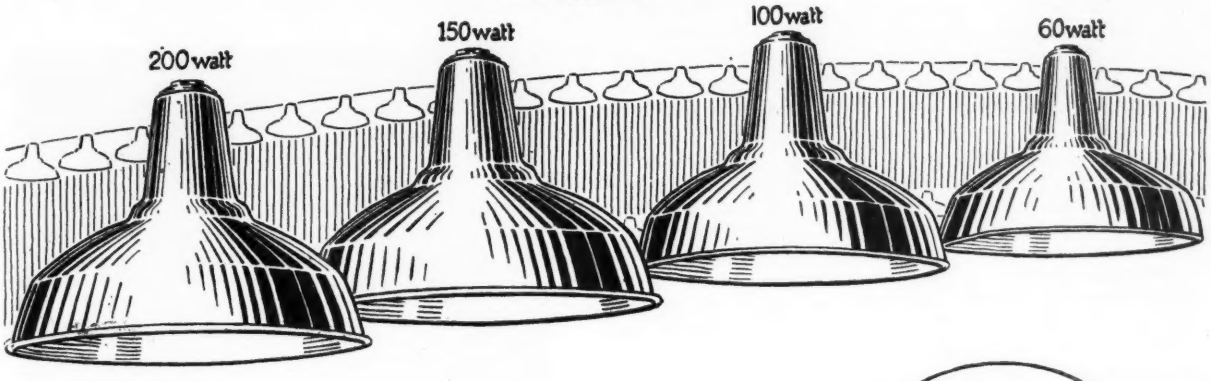
No. 1008. Catalogue giving full details of prices, spacing and mounting heights, etc.

No. 1009. "The Evolution of Industrial Lighting," an interesting booklet for contractors, central station and works engineers, giving particulars of manufacture and special vitreous enamelling process used on Benjamin Reflectors.

No. 1 10. "A Note Book on Industrial Lighting," for installation engineers with tables and useful data showing how to plan out industrial lighting.

Each or all of them yours for the asking

BENJAMIN ONE PIECE REFLECTOR



Made in ONE PIECE from the original sheet steel by seventeen processes through specially constructed giant presses.

For the information of all those connected with industrial lighting we emphasise eight points.

(1) The Benjamin R.L.M. is designed and manufactured exclusively in this country by The Benjamin Electric Ltd.

(2) It is the outcome of years of experience in all phases of industrial lighting and is of the type which is recommended under the specification of the B.E.S.A.

(3) The accuracy of the methods of manufacture ensures perfect uniformity and the data supplied as a guide to those responsible for its use will, if followed, give uniform and completely satisfactory lighting results.

(4) It is the one reflector which adequately fills all industrial lighting conditions.

(5) It is vitreous enamelled by a process of fusion, giving practically an opal glass surface to a steel reflector, ensuring maximum reflection free from striations and a surface which is easily cleaned and resists corrosion under normal factory conditions.

(6) It is the most simple to install, maintain and "free from trouble" reflector on the market.

(7) The designation "R.L.M." is a registered trade mark of The Benjamin Electric Ltd., and can only be applied to reflectors supplied by them.

(8) If you specify or use the Benjamin ONE PIECE R.L.M. Reflector you are assured that you take no risk. You have the best design, scientifically and mechanically, that can be produced.

The Standard Benjamin R·L·M Reflector now made in ONE PIECE

The Benjamin One Piece Reflector makes good lighting simple

Manufactured solely and throughout by

The BENJAMIN ELECTRIC Ltd.

Makers of Better Lighting Equipment

BRANTWOOD WORKS, TOTTENHAM, LONDON, N.17

(*Continued from p.* 311.)

Types of Equipment.—The distribution of light from gasfilled lamps can be considerably improved by the use of well-designed lanterns and light-directing equipment. Commercially good street lighting has much to commend it, and there are instances where co-operative efforts to improve the lighting of a street have resulted in considerable advantage to the shopkeeper. It is obvious that the more light that is used the better, and it is one of the easiest ways of contributing to the general comfort of the community.

Standardization.—The draft specification of the British Engineering Standards Association, issued early this year, dealing with the problem of street lighting, represented an attempt to formulate definitely the conditions which are generally agreed to be conducive to good street lighting. The specification aims rather at conveying a series of suggestions which are based on the findings of the very representative committee whose sittings extended for a period of two years.

The specification contains suggestions for a general classification of streets in terms of minimum illumination, and also a clause intended to limit the detrimental influence of glare. Considerable importance attaches to the clause limiting the heights of light sources according to the class of street. It is hoped that this specification will have a useful influence in raising the general standard of public lighting.*

Progress in Public Lighting in Glasgow

The annual report issued by Mr. S. B. Langlands, Inspector of Lighting for the City of Glasgow, is of interest in showing the difficulties imposed by the coal strike last year. The lighting of streets was never entirely suspended, the Emergency Committee set up by the Corporation rightly recognizing that reduction should be as little as possible, in view of the importance of the lighting from the standpoint of public safety. Repair work and new erections were never stopped, and no employee of the department was absent from duty owing to the dispute. Nevertheless many reductions were effected. In some streets smaller mantles were substituted and lights were extinguished at a somewhat earlier hour at night during the summer. Private lamps, except those of doctors and druggists, were unlit from October 25th to November 25th. The dim lighting and the unavoidable delay in carrying out repair work gave rise to some complaints from the public. Improvements and extensions were naturally delayed.

Nevertheless there has been continuous progress, and the arrears of work appear to have been largely overtaken during subsequent months. Alterations include the substitution of gasfilled lamps for gas burners or flame arcs in certain streets. Special lanterns designed to direct light along narrow and much-frequented passages have been installed. A considerable amount of new lighting in connection with housing schemes, etc., has also been undertaken.

As in the previous report, a special feature is the development of illuminated traffic signs. "Keep to the left" signs, supplemented by special local lighting, have been installed at several busy junctions. The fitting of electric lamps in lettered ruby globes to mark positions of fire alarms, and the installations of lamps in telephone kiosks have been continued. Two special illuminated signs, to the Chief Constable's requirements, were erected near the new bridge at Killermont. These made visible at a distance instructions for the stoppage and movement of traffic over the temporary and narrow roadway of the bridge. The instructions were shown in red and green, by the lighting or extinguishing of appropriate electric lamps from a switch under the control of the constable on duty. This is an illustration of the fact that in this country, as in America (where the method is much more widely used) luminous devices may be of considerable assistance in the direction of traffic.

* A fuller account of the specification will be found on p. 323.

The Lighting of Open-air Swimming Baths

Whilst swimming baths under cover are habitually lighted artificially, and in some cases are much patronized during evening hours, the artificial lighting of open-air baths is apt to be neglected. In order to be really effective, both for spectacular purposes and as a measure of safety, an even illumination of at least 2 to 3 foot-candles should be maintained. Owing to the large area of water, lighting units suspended on ropes spanning the bath are not always convenient. In most cases, however, effective lighting can be furnished by means of high candle-power lamps on masts. The picture shows the illumination of some open-air baths in Germany by means of the new Dia-Carbone flame arcs (recently introduced into this country by Messrs. Körting & Mathiesen Electrical Ltd.). It is estimated that an area 70 metres long and 50 metres broad (say 3,500 square metres) can be effectively lighted by eight or twelve lamps of this type, and the running cost, estimated at 1 to 1.40 marks (say 1s. to 1s. 4d. per hour) is not excessive compared with the advantages obtained.

FIG. 1.—An Open-air Swimming Bath in Germany, illuminated by Dia-Carbone flame arc lamps.

Better Mill Lighting

THE accompanying photographs illustrate the night effect of a new illumination system installed at Birks Mill, Walsden, near Todmorden, for Messrs. John Cockcroft & Sons Ltd. Fig. 1 shows the new extension to the mill, which was treated first; the installation comprising 25 R.L.M. reflectors with 200-watt "Cosmos" gasfilled bowl sprayed lamps, mounted at a height of 10 feet above the floor on 11-foot centres, producing an average illumination of 8 foot-candles on the work.

FIG. 1.—Lighting of the New Extension to the Mill.

This installation gave such successful results, in terms of better working conditions, increased output, etc., that Messrs. John Cockcroft & Sons Ltd. decided to modernize the lighting of the old section immediately. The old lighting was by means of 60-watt vacuum lamps in conical enamelled-iron shades, mounted at 6 feet above the floor on 9-foot centres, producing an average illumination of 1½ foot-candles. Glare from lamps in the line of vision was prevalent, and the dark surroundings were depressing to the workers.

FIG. 2.—New Lighting Installation in the Old Section of the Mill.

Fig. 2 shows the new installation, comprising 67 R.L.M. reflectors, with 100-watt "Cosmos" gasfilled bowl sprayed lamps, mounted at 9 feet above the floor on 9-foot centres, producing an average illumination of 6 foot-candles on the work. This intensity is quite sufficient in the old section, as the materials woven are of a very light colour. The results are pleasing, giving a uniform illumination with absence of glare.

For the inspection room four R.L.M. reflectors with 300-watt "Cosmos" gasfilled daylight lamps, mounted 10 ft. 6 in. above the floor on 10-foot centres, are installed, producing an illumination of 10 foot-candles of approximate daylight colour. This arrangement enables inspection of the woven materials to proceed irrespective of natural daylight and ensures no faults being overlooked.

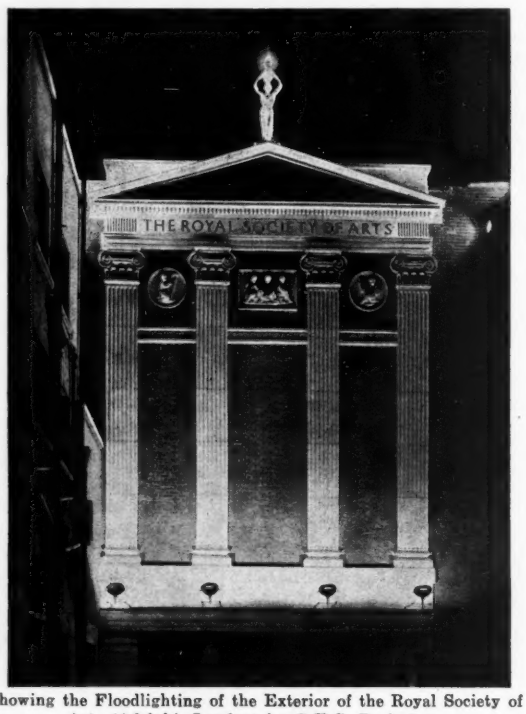
Messrs. John Cockcroft & Sons Ltd. are convinced that good lighting is a sound economic proposition, ensuring a better product at less cost, due to less faults and increased production.

The installation was carried out by Fred Rothwell Ltd., the Baum, Rochdale, to the illumination specification designed by Messrs. Metro-Vick Supplies Ltd.

Floodlighting at the Royal Society of Arts

THE exterior of the Royal Society of Arts, which has afforded hospitality to many meetings of the Illuminating Engineering Society, has recently been floodlighted, and the accompanying illustration gives a good idea of the effect.

The installation was carried out mainly by four G.E.C. floodlight projectors, equipped with 500-watt Osram lamps, which are mounted on specially designed brackets. The figures and the name of the Society, however, receive special treatment by two projectors equipped with 200-watt lamps. The picture illustrates the even illumination produced.



Showing the Floodlighting of the Exterior of the Royal Society of Arts (Adelphi, London) by G.E.C. Projectors.

During recent years floodlighting has been applied to many commercial buildings, but it is somewhat unusual to find the method adopted by a scientific society. The Royal Society of Arts is to be congratulated on its enterprise in thus helping to make the whereabouts of its historic building better known, and in utilizing light in order to call attention to its excellent work.

Roof Lighting

The Illustrated Carpenter and Builder has some useful comments on the above subject. It is remarked that the framed skylight is generally regarded as unsafe—in the sense that it cannot be kept indefinitely watertight. It is also expensive owing to the special roofwork involved. In the writer's opinion there is only one reason why a framed skylight should ever be used.

A much better, cheaper and quicker job, the author suggests, is the substitution of glass tiles or slates for natural materials. Glass tiles have recently been introduced and it is possible that they will ultimately replace the framed skylight.

A National Gas Conference

THE British Commercial Gas Association held its sixteenth Annual General Meeting and Conference at Southampton on the 3rd, 4th and 5th October last. The President, Sir Russell Bencraft, M.R.C.S.E., J.P. (Deputy Chairman of the Southampton Gas Light and Coke Company), was unfortunately unable to attend owing to illness resulting from an accident. The immediate Past President, Mr. John E. Cowen, J.P. (Chairman of the Newcastle-upon-Tyne and Gateshead Gas Company), therefore took charge of the meeting.

The proceedings opened on the Monday evening with a dinner on board the R.M.S. "Majestic," by the courtesy of the Directors and Managers of the White Star Line and by invitation of the Chairman and Directors of the Southampton Gas Light and Coke Company, to the President-elect, Vice-Presidents and members of the B.C.G.A. and visitors.

On the Tuesday morning the members assembled in the Royal Pier Pavilion, and were welcomed by His Worship the Mayor of Southampton. The annual report and statement of accounts of the Association were then presented, after which the Presidential Address by Sir Russell Bencraft was read by Mr. J. R. H. Jacobs, F.C.I.S., F.S.A.A. At the afternoon business conference a very able address on "Salesmanship in the Showroom" was given by Miss Gladys Burlton, B.A. (Lond.), principal of the Burlton Institute, London. In the evening, after a reception in the Royal Pier Pavilion by His Worship the Mayor of Southampton, a lecture was delivered by Sir Bruce Bruce-Porter, K.B.E., C.M.G., M.D., on "New Health: The Importance of Health in Industry." The business conference on Wednesday included a paper by Mr. Ralph Halkett (General Manager and Secretary of the Sheffield Gas Company) on "The Commercial Prospects and Future Co-operation of the Gas Industry," and a report on special research carried out on the subject of "Flueless Rooms," by Mr. Arthur H. Barker, B.Sc., B.A., Lecturer on Heating and Ventilating Engineering, University College, London.

Among the distinguished guests who sat at the table of Colonel E. K. Perkins, C.B.E., M.P., D.L., J.P. (the Chairman) at the dinner on the "Majestic" were Viscount Burnham, Lord Riddell, Mr. J. E. Cowen, the Mayor (Alderman P. V. Bowyer), Sir Lawrence Weaver, Alderman F. Brown, Sir R. Linthorne (Town Clerk), Alderman F. S. Phillips, Mr. F. W. Goodenough, the Rev. J. Chitty and Mr. C. B. Johnson. Near by was Mr. H. D. Madden, President of the Institution of Gas Engineers.

A full report of the proceedings of this important conference is contained in the technical journals of the gas industry, but some of the points from the Presidential Address, papers and speeches are given below.

Viscount Burnham on "The Gas Industry."

Viscount Burnham, proposing the toast of "The Gas Industry" at the dinner, said he was giving them the toast of what was the pivotal industry in the British-speaking world. Apart from being a mine of national wealth, the gas industry had become the mighty storehouse of national energy. To-day the gas industry, carbonizing more than sixteen million tons of coal a year and supplying over eight million consumers, had no equal as a creator and purveyor of heat to mankind. In fact, it would be difficult to exaggerate the importance that gas has been to national economy and to national efficiency on its industrial side; and on its domestic side what it had meant to the people in terms of human happiness and comfort.

On the Tuesday morning Viscount Burnham, after congratulating the members upon the great progress that had been made by the Association, said he admired the gas industry because it had been founded on the British principles of self-help and self-reliance. It had had practically no assistance—though he would not say it had had no hindrance—from the State in the work it had carried on. In this respect the gas industry produced a great contrast to the sister industry, electricity, which was the petted child of Parliament almost from the first, though Parliament had chastised it from time to time in a manner that it might not always have liked. The gas industry had had to work out its own destiny. It had had to do it sometimes without much encouragement and always with a certain amount of dismal croaking as to what its fate would be eventually. All these prophecies had been unfulfilled in the past; and he felt certain they would be unfulfilled in the future.

He did the newspaper press of the country the credit of believing that gas would not be so discussed in its columns, as was the case, from both scientific and practical points of view, were it not that the industry had convinced those who conducted the press of the real value of gas to the community, and of what it was going to count for in the future even more than in the past.

Mr. Leon Gaster (Illuminating Engineering Society) said he had been glad to notice that Mr. Frank Hodges, as one of the members of the Electricity Board, gave a warning to the electrical people to the effect that, while they should do what they could to improve the service to the public, they must not forget that fighting and opposition were only a waste of time and energy. The public wanted the best service, and both electricity and gas could give it in their respective spheres.

The Presidential Address.

The Presidential Address of Sir Russell Bencraft was a remarkably clear statement of the reasons for the existence of the British Commercial Gas Association and an explanation of some of its chief preoccupations. A full report cannot be given in these pages, but the following passages will give an idea of the many problems discussed.

The Value of Co-operation.—To the general public whom the gas industry supplies with certain elementary essentials of civilized existence—heat and light—it is of more than passing interest to know that the activities of this non-trading Association of gas supply undertakings have been able very materially to improve the service given by its members to consumers, and that they can and will make possible further great improvement in the future.

To the industrial and trading public it is of immediate value to know, first, that this improved service has steadily increased the popularity and sales of our commodity; secondly, that such results can be obtained by combination and co-operation, especially in the fields of research and of publicity; and, thirdly, that for us, as for most commercial enterprises, the research that it is necessary and profitable to conduct includes not merely technical research on the manufacturing and engineering side of the business but everything that is, or should be, covered by the current term "market research." It is with this end of the business—the selling end—that the British Commercial Gas Association is especially concerned. . . . .

The Results of Co-operation.—During the 15 years in which the B.C.G.A. has been in action, the consumption of gas has increased by more than 30 per cent.; and you cannot study the history of this progress without being forced to the conclusion that our co-operative effort has been a principal factor in achieving it. We know also that every increase in the use of gas—or of coke—for producing heat or power means that more coal, instead of being burned raw, has been converted into more efficient fuels than itself, with recovery of by-products to boot. We know that this means not only less wasteful and more fruitful use of the most important raw material that this country can produce, but also the elimination of much waste of time and energy and even health in homes and factories where gas replaces coal. . . . .

Status of the Sales Manager.—It is imperative that the Managers who control the selling side be acknowledged to occupy a position at least equal to that of the Engineers. There has in the past been some

reluctance to admit this, and one understands why. The engineering work is spectacular and the other is not; the first is done openly for all to see, the other quietly in an office and in the homes of the people. The Engineer at the outset of any new development lays plans and specifications before his Board which immediately arouse their interest; the Manager's plans for development of sales cannot, in the nature of things, be presented with the same picturesqueness, nor do they suggest results that can be so easily visualized. Yet the Manager's plans call for the highest possible degree of judgment, foresight and imagination, and quiet and dogged patience and perseverance. Again, the Engineer has his concrete structure to show growing at every stage until completed—obvious to all. The Manager is raising a structure of goodwill, intangible yet real—obvious to none but close observers. On this basis of goodwill he builds up a structure of profit—but his right to the credit for this is not always recognized. Yet where would be the need for new buildings on our works, for extensions of machinery and plant, if the Sales Management had not first built up the structure of goodwill and the increased demand for gas which cannot rise on any less secure foundation? . . . .

National Service.—We in the gas industry are making a practical response to the appeals which the Presidents of the Board of Trade and the Board of Education have addressed to industry in general. We are using co-operation to improve the efficiency of the industry and of the service that it gives. We are engaged on a class of advertising and of salesmanship which, if successful, must add to the national prosperity. We are ensuring its success by grounding our publicity on a broad, yet detailed, study of the public's present and future needs. We are deeply conscious of the urgency of establishing a definite scheme of training for our salesmen, which will enable us to give the fullest practical effect to our principle of serving the consumer. And we are co-operating with educationists in order to achieve this end. . . . .

Welfare of Industrial Workers.—The Government proposes to introduce a Factory Bill next session, designed to raise the standard of the more backward factories to the level which has already been reached by the more progressive. How far has that standard advanced? The rate of progress will depend on what we and others can contribute to factory hygiene. It is not without purpose that we have devoted much research to the contribution we can make, in providing gas as an industrial fuel, for water heating and canteens, for lighting and so on. You have only to look at our published literature on industrial uses of gas to see the attention we have always given to the conditions of the worker in regard both to his actual labours and to provision made for his more general welfare. It is at once a human and a commercial argument for gas that where it has become the fuel of industry the working conditions have been vastly improved. Hot, heavy labour in stoking, clinkering and removing ashes has been ended. Cleanliness has replaced dirt. And, on the other side, gas cooking has made possible the factory canteen. I am quite sure that but for the service we are able to render in these directions, the standards set by the new Factory Bill would be much lower than in fact they will be. If much of the unhygienic conditions and much of the hard conditions of factory work are ended, and if we are also able to make possible clean, healthy, labour-saving homes in clean and sunny cities, will the industrial age in which we live be any longer sad? Will it not lose its ugliness and hardness?

Training and Salesmanship.—Miss Gladys Burlton, B.A. (Lond.), in her address wasted no time in putting the necessity for training the salesmen's staff on its proper basis. No particular moral virtue, she said, attached to the staff training. It is entirely a business proposition, and should be judged wholly by its effects on the profits. The sooner they could get away from the sentimentalism which had been introduced into discussions of the subject the better it would be, because it clouded the issue, and was untrue. People were undertaking staff training because they found that it paid, and that it was essential to the proper conduct of their business.

Training should be given in business hours. It was just as much a part of the business as anything else; and it should be made a definite part of the duty of the selling staff to attend. They should concentrate on the young people directly they came in. It was a great mistake to let a salesman start, even for a week or two, without some training. Apart from this teaching, there should be frequent meetings for discussion with the seniors. The final point for consideration was the training of the trainer. Perhaps courses could be arranged for people who were interested in taking up staff training.

My work (Miss Burlton added) brings me into touch with many industries, each trying to face and solve the educational problem. But from what I have seen of the ways and works of the gas industry, particularly the London Gas Light and Coke Company, with which I am most closely associated, I should say that you are unusually alive to the problem and, more than that, are tackling it in a way which is bound to improve your service and the goodwill of the public towards you.

The Simple Laws of Health.

Speaking on health in relation to industry, Sir Bruce Bruce-Porter, one of the founders of the New Health Society, said that anything which lightened labour in the home must make for happiness in the worker. He wondered how long mere man could escape the lunatic asylum if he had to carry out the duties of the home that fell to the housewife's lot before the general spread of gas cookers and gas fires had taken the non-productive labour, the waste of time and effort, out of housework.

A Revolution in Housework.—He was sure one reason why so few girls would go into domestic work in the kitchen was the influence of the older women, who remembered the slavery of the kitchen range, and the heavy loads of coal and dirt and ash they had to carry. To-day, however, gas cookers, and coke-boilers for continuous hot water, had revolutionized the kitchen. This should increase interest in the art of cooking, a great force for happiness; and it meant that though the leisure in most housewives' lives was small it was much greater in gas-furnished homes.

Fitness the Worker's Capital.—Sir Bruce urged the necessity of every industrial worker taking a personal interest in his physical fitness. His health was almost his sole capital, and he ought to be ready to undergo medical examination, lest a defect in health should not be detected in time.

1,200 *Gallons of Blood.*—After examination, what the worker most needed was fresh air. The more extended the use of gas, the better the air of our cities would be; and ventilation in factory, workshop and home must always be provided to the full. Proper breathing of pure air was essential to health and a good chest expansion. It should be obvious that a poor chest expansion was a terrible handicap on the heart, which in 24 hours had to pump over 1,200 gallons of blood through the lungs.

The Need of Drinking.—Next to fresh air, Sir Bruce stressed the need for fresh water. People did not realize how much fluid they required—under ordinary conditions four pints a day of moisture were given off by the breath and skin alone, and the kidneys needed 2½ pints. He had once met a man who was engaged in very hot work on a gasworks and therefore needed much extra water, but was drinking none at all in the belief that it was bad for rheumatism. This was an extreme case showing the need for education in the simple laws of health; for here was a man engaged in an industry which really took an interest in its workers, and though oatmeal water was provided for the men when actually at work, he yet had failed to grasp its value.

Simplified Cooking.—Next came the need, said Sir Bruce, for fresh food—and for good cooking. The very poor, living in a single room, must find the difficulties of cooking terrible, often impossible. Several small gas cookers for such homes had been produced, and it would be a boon if every home were so fitted. Herein he prac-

tised what he preached. In both his town and his country house, said Sir Bruce, the whole of the cooking was done by gas, and in the New Health Society's Offices gas had displaced coal completely. Everything the gas industry was doing to simplify the construction of new houses was a work of national importance.

CO-OPERATION IN THE GAS INDUSTRY.

Mr. Ralph Halkett, in his paper, dealt with the difficulties experienced by many of the smaller gas undertakings—lack of capital, inability to purchase the most suitable coal for carbonization, and lack of the broad experience gained by the larger undertakings. His suggestions for overcoming these difficulties were, either the supply of gas in bulk by large undertakings to the smaller ones, or the definite linking-up of the smaller undertakings with larger ones in their vicinity. If the former course be adopted, he said, they still, in some cases, could not afford to relay or extend their mains and services, to supply better and more up-to-date fittings, or maintain a staff of experts to give advice from time to time. Therefore, personally, he urged the alternative—that of purchase and absorption by the larger undertakings. He was confident that, if the gas industry took all possible steps to ensure a satisfactory service, the use of gas at a moderate price could be extended throughout the country in face of any competition.

FLUELESS ROOMS.

Mr. Arthur Barker's report on special research on flueless rooms is held over. It is hoped to give next month a full version of the experiments carried out by Mr. Barker, in view of the fact that the Ministry of Health are at the present time looking carefully into this important matter.

The conference was an unqualified success, due in no small measure to the untiring efforts of the President of the Association and the Directors and other officials of the Southampton Gaslight and Coke Company.

Where Shadowless Illumination is not Desired

The merits of "complete diffusion" of light are so often emphasized that it is well to remember that cases occur where distinct shadows have a very definite value. An instructive example is furnished by the accompanying illustration, which appeared in a recent issue of the *Kandem Monatschrift* (the organ of Messrs. Körting & Mathiesen, of Leipzig). Here we have a delicate piece

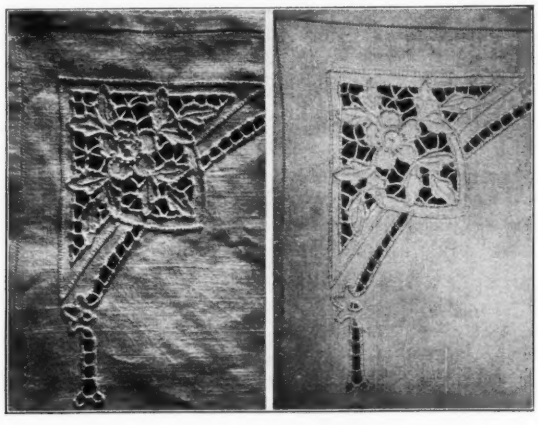


FIG. 1.—Illuminated Embroidery.
(*Left*) By direct oblique light. (*Right*) By diffused light coming from all directions.

of embroidery. On the left we see the effect by direct oblique lighting, which throws the projections into relief and enables the pattern to be clearly seen. On the right we have the same material illuminated by highly diffused light; both the pattern and the texture of the material are much less evident.

This simple experiment no doubt helps to explain the preference of many workers for a well-shaded local light, rather than well-diffused general illumination from semi-indirect units. The same consideration might well be borne in mind in show-window lighting. As a rule, hard shadows are not desired, but cases may arise when it is desirable to supplement the general soft lighting by oblique local lighting, so as to reveal the pattern of some special article.

The New Central Baths, Bermondsey

AN IMPOSING INSTALLATION.

An interesting event on September 24th was the opening of the new Central Baths, Bermondsey, which constitute, from the architectural point of view, one of the most modern and up-to-date public baths and washhouses in London. The excellent style in which everything has been done is illustrated in a souvenir booklet issued on the opening day, and also in a special article in *The Builder* for October 14th.

It is satisfactory to note that the lighting arrangements are fully in keeping with the general high standard of equipment. The Baths and Washhouses Committee, on July 18th, 1923, engaged Mr. L. Gaster to advise and report upon the illumination of the new building, and the Council is to be congratulated on their enterprise in thus securing expert attention for the lighting arrangements.

In a coming issue we hope to give some fuller particulars of the lighting equipment. Meantime it may be mentioned that the predominant note is ample illumination combined with absence of glare, and that the special feature is the liberal provision of switching equipment, necessitated by the requirements of the installation.

The Scottish Electric Lighting Service Bureau

SEASONAL ACTIVITIES.

We understand that the Scottish Electric Lighting Service Bureau of Glasgow is already commencing its work for the present lighting season, and plans for activities in the near future are well advanced.

Besides the usual demonstration work of the Bureau, lectures on applications of electric lighting will be delivered to numerous societies and commercial groups throughout Scotland. In Edinburgh alone a series of six lectures has been arranged, with the aid of experts from the London Lighting Service Bureau. This series of lectures comprises a complete illumination design course, intended mainly for those engaged in the electrical industry.

The following societies and associations, amongst others, have already arranged to receive lectures dealing with aspects of illumination of special interest to them: The Master Printers' Associations in Edinburgh and Aberdeen; Rotary Clubs in Aberdeen, Inverness and Kirkcaldy; the Drapers' Association; the Electrical Association for Women; the Philosophical Society and Students from the Royal Technical College, Glasgow.

During the next three months 23 events have already been fixed, and many others are in course of preparation.

Sheffield Illumination Society

A very pleasant evening was spent on the 14th October, 1927, at the St. Marie's Club, Townhead Street, Sheffield, when the members of the Sheffield Illumination Society were entertained.

An indoor sports match was arranged, and this provided some very enjoyable games, billiards, snooker, dominoes, draughts, chess, whist, crib and rifle-shooting being participated in.

After the game several musical items were rendered by the members of the St. Marie's Club, and also by members of the Society. The result of the match was: St. Marie's, 21 points; Illumination Society, 14 points.

The British Engineering Standards Association Specification for Street Lighting

THIS specification was presented in draft form before the Illuminating Engineering Society in the early part of this year,* and has also been discussed before the Institution of Electrical Engineers and the Council of the Institution of Gas Engineers. It was also presented before the Institution of Public Lighting Engineers at the Conference held in Brighton last September.† This discussion has already rendered its contents fairly familiar. The specification has now appeared in its final form.‡ It may, therefore, be well to recall some of its main features.

Definitions.—The initial clauses are devoted to definitions, the most important of which is the "test point." This denotes the point on the ground within the area to be illuminated which is equidistant and as far as possible from the light sources which form one complete unit of the system. The illumination measured at the test point is thus approximately the minimum. The "mean test-point illumination" is the mean of of illuminations measured at the test points in one class of installation. "Service illumination," as compared with "rated illumination," is the illumination which actually prevails at any time during the operation of the installation. "Spacing-height ratio" is the ratio of the distances between two adjacent light sources to the height of the light source from the ground immediately below it.

Classification of Streets.—Installations are divided into eight classes, with rated mean test-point illuminations as follows:—

TABLE I.

Class.	Rated mean test-point illumination.
A	2.0 foot-candles and upwards.
B	1.0 foot-candle
C	0.5 ,,
D	0.2 ,,
E	0.1 ,,
F	0.05 ,,
G	0.02 ,,
H	0.01 ,,

NOTE.—Class H installation is not recommended for streets which are likely to be used appreciably for through traffic.

Clause 10 explains the selection of test points, and Clause 11 contains the provision that "unless otherwise prescribed the illumination at any test point under rated conditions shall not be less than one-half the rated mean test-point illumination specified for the appropriate class."

Service Illumination.—It is also specified (Clause 12) that in practice the mean test-point illumination is not to fall below one-half the rated mean test-point illumination specified for the class concerned; further, the service illumination at any individual test point shall not in any circumstances fall below 25 per cent. of the rated mean test-point illumination given in Table I. In Clause 13 it is specified that "the illumination on the ground shall be so graded as to avoid an abrupt change at any point."

Minimum Heights.—The next clause (14) marks a new departure by setting a limit to the heights of standards, which are specified as follows:—

TABLE II.

Class.	Minimum height of the luminous centre of the light sources above the ground.
A	30 feet.
B	25 ,,
C	21 ,,
D	18 ,,
E	15 ,,
F	13 ,,
G	13 ,,
H	Preferably 13 ,,

NOTE.—When the light sources are enclosed in well-diffusing translucent envelopes it is recognized that the minimum height given in the above table may not be essential, and a minimum height should be agreed to by the parties concerned.

It is specified (Clause 15) that the spacing-height ratio should be chosen to give the best distribution of illumination, having regard to all the circumstances of the case in question, but shall in no event exceed 12.

It is laid down in Clause 16 that "installations should be as free as practicable from objectionable glare," and in an appendix a method is given enabling an approximate estimate of the glare from a given installation to be made.

Description of Tests and Appendices.—This concludes the chief clauses in the specification, which are commendably simple. In the next section the method of carrying out tests is explained, with the aid of diagrams included in an appendix. Illumination tests in the street are to be taken only when the climatic conditions are agreed to be satisfactory by the parties concerned. In cases where it is impracticable to carry out street tests, or in cases of dispute, tests may be made at an agreed testing laboratory. The practice to be followed in this case is also indicated. Finally details of information to be supplied with inquiries or tenders are given. The former should include class of installation desired (see Table I), normal pressure and calorific value for gas, or declared voltage and nature of supply for electricity, and any preference as to positions of light sources. Tenders should include light distribution, curves of fittings and particulars of the luminous output of light sources, and the type, rating, and total number of lamps to be used. Details of consumption and, in some cases, the positions at which illumination tests are to be made should also be given.

The appendices contain further notes on testing, which are aided by numerous diagrams and tables, and a description of the method of determining the "glare factor," which is useful in indicating whether complete compliance with Clause 16 is secured. It is believed that when the coefficient "G" does not exceed 10 the glare is not likely to be objectionable.

Estimation of Glare.—The investigation of glare is effected as follows: For any position in a given installation it is possible to determine a coefficient "G," which is approximately a measure of the effect of glare on ability to perceive detail. If this coefficient is found for several positions a curve representing the approximate amount of glare along the street may be plotted.

If I is the luminous intensity at any angle, as determined from the polar curve, and h the height of suspension above ground level, the values of $m = \frac{I}{(h-5)^2}$ are plotted as a polar curve on a series of special diagrams (reproduced in the appendix). On each diagram is a series of lines corresponding to various values of the coefficient "G." From the intersection of the "m" curve with these "G" lines the value of G corresponding to any angle can be found. In the appendix to the specification dealing with glare several actual examples are worked out, showing the application of the method.

It is to be observed that this coefficient is concerned only with the reaction of the eyes of any observer looking parallel to the street surface to the degree of glare in the artificially lighted street, which is only one of the influences which affect the visibility of objects. It is not to be taken as an overall figure of merit for the installation, nor as a criterion of its revealing properties, in which it enters only as one of many factors.

* *The Illuminating Engineer*, April, 1927, p. 106; May, 1927, pp. 141–146.

† *The Illuminating Engineer*, Oct., 1927, pp. 274–6.

‡ B.S. Specification No. 307, 1927, obtainable from the B.E.S.A. Publications Department, 28, Victoria Street, London, 2s. 2d., post free.

Industrial Lighting

Some Notes on the Report of H.M. Chief Inspector of Factories for the Year 1926

THE Report of H.M. Chief Inspector of Factories for the past year again contains numerous references to factory lighting. The importance of the subject is emphasized, and it is remarked that if output and good workmanship are to be maintained lighting must be adequate in amount and suitable for the particular work in hand. Quotations from reports from inspectors in various districts, mentioning special problems and methods of solving them, are included.

Mr. Werner (Midland Division) alludes to the existence of two distinct systems in workshops in Coventry: (1) individual lamps for each machine, and (2) powerful lamps, suitably shaded, fixed high up. The latter system is generally preferred in saw mills, aeroplane and motor engine shops, and in most large open shops, if there is not too much overhead gearing. But for many special processes—machine engraving, power press work, spoke heading and swaging, small electric work (e.g., in connection with magneto, radio or telephone making) and watch-jewel making—local lights are preferred. The use of bench covering of such a colour and texture as to prevent reflection of light into the eyes of workers has now become established in certain factories.

Mr. C. H. Taylor (Shrewsbury) alludes to the use of a bench illumination of 10 foot-candles in a factory where safes are made. "Artificial daylight" is being more widely used in the colour-mixing rooms of some of the worsted-spinning mills in Halifax, and in Newport and Wrexham, where accurate colour-matching is done. Mr. Owner (Bristol) mentions a case in which glare was caused by lamps situated near machines in a clothing factory; by substituting gasfilled lamps in Holophane reflectors conditions have been much improved, and at the same time the number of lamps necessary and the cost of the lighting have been diminished.

Mr. Clark (Finsbury) refers to the tendency to concentrate light on the working area and to use a lower standard in the alleyways, and deeply shaded lamps are now being adopted. The first impression that the effect is "gloomy" seems to disappear with time. Almost every factory and each type of machine presents special problems. Mr. Turner (Reading) describes the efforts of workers to mitigate glare from lamps at head level by attaching paper shades to the reflectors. A special permanent device—an adjustable cylinder mounted round the lamp—has now been substituted and answers well. Miss Ewart (Leeds North) also mentions a factory in which it was found necessary to extend the original shallow reflectors by adding a band of enamelled metal 3½ inches deep. In another factory each machine was fitted with a 20-candle-power needle light, general lighting being effected by means of 75-100-watt lamps in Benjamin reflectors. The needle lights were under the control of individual workers, which has led to economies. On lithographing machines in a printing works the men suffered from reflected glare off the yellow paper. As an experiment, blue-tinted lamps were substituted for the ordinary clear bulbs, and the men stated that they had now no feeling of eyestrain. Mr. Dymock (North-Eastern Division) also refers to a lithographic printing works in which general lighting was supplemented by well-shaded local lights of lower candle-power. The white ceilings and white-and-green walls were favourable to diffusion of light. Mr. Phillips (Liverpool) mentions a case of a clothing factory where sewing machines are equipped with 6-candle-power local lamps mounted at the head of the machine in addition to general lighting. The small lights are protected by metal shades so that the filaments are completely screened from the eyes of workers. Mr. Le Couteur (North-Western Division) records an apparently very successful lighting installation in a large weaving shed in Leigh, having an area of 75,000 square feet and containing 253 looms; 500-watt gasfilled lamps are used and are mounted 12 ft. 6 in. from the floor. Above each lamp is a reflector 2 feet in diameter, and the whole is enclosed in a diffusing glass globe. 253 lamps in all are used. The effect is a soft and pleasant light, and the efficiency of the system is enhanced by the fact that each loom has its own motor drive, the motor being adjacent to the loom, so that there is no overhead transmission machinery to obstruct the light.

Mr. Brown (Scotland) remarks that the lighting of foundries deserves special consideration in view of the fact that the illumination is required mainly at floor level, and also on account of the very dark walls. In several cases special lighting installations, giving the required conditions, have been installed. As an instance of the advantages of good illumination the experience of a large firm of rubber manufacturers is quoted. By re-arrangement of the lighting in several departments increases in output of 7 to 16 per cent. have been secured.

Finally, attention may be drawn to an important point raised by Mr. Allhusen (Edinburgh) in connection with the vision of workers. In the Valleyfield Mills, Penicuik, it was found that a great deal of defective paper was being sent out from the finishing department. Dr. Badger, the certifying surgeon, made a careful examination of the eyes of all the workers and found that no less than 25 per cent. of them had defective vision and required glasses. Since these have been supplied there have been no more complaints from customers of the quality of paper supplied.

The recommendation of the Lighting Committee that a collection, for various industries, of a sufficient number of observations should be made to give some indication as to the best practice regarding lighting has been followed again this year; the observations were taken principally in the cotton trade in Lancashire and in the metal industries in the Birmingham area.

Hours of Connecting Lighting Load

It is not often that one sees an attempt to estimate the number of lighting hours available from different types of consumers. The following table obtained by a company in Boston (Mass.), and quoted in a recent issue of *The Electrical World*, are therefore of interest. It may be observed that barbers' shops, restaurants and floodlighting figure amongst the longest hour users, while churches and day schools, as might be expected, are the worst. At first sight it may seem surprising that picture palaces, which work almost continuously for a considerable part of the day, should also come low on the list. But it is possible that this value is affected by the circumstance that the lighting of the hall in which films are shown would only be used occasionally, and this may pull down the general level.

ANNUAL HOURS' USE OF CONNECTED LOAD FOR VARIOUS TYPES OF COMMERCIAL CUSTOMERS.

Kind of Establishment.	Annual Hours' Use of Connected Load.
Armouries and dance halls	1,500
Bank	500–1,000
Barber shop	3,000
Bowling alleys and billiard parlours	3,000
Churches	500
Clubs	2,200
Factories	1,000
Filling stations	2,000
Floodlighting	2,000–4,000
Garage	1,500
Hospital	2,000
Hotel	2,500
Library	2,000
Lunch rooms	2,000–4,000
Offices and public buildings	1,800
Restaurants	1,000–2,000
Schools (day)	300– 500
Schools (boarding)	500–1,000
Showcases	2,000
Signs	2,000
Signs (billboards)	2,000
Stores (under 2 kw.)	1,200
Stores (over 2 kw.)	1,800
Stores (drug and candy)	2,000
Theatre (regular and vaudeville)	1,700
Theatre (movie)	700
Windows	1,800
Yard lighting	2,000–4,000

THE INTERNATIONAL ILLUMINATION COMMISSION.

(To the Editor of "The Illuminating Engineer," London.)

DEAR SIR,—Having had the pleasure of meeting you at the sessions of the International Commission on Illumination, which have just been held at this delightful lakeside spot, and having noticed the keen interest which you take in all matters apt to promote the useful work of the I.C.I., I beg to put before you some observations and remarks on the subject of these meetings.

If you agree—wholly or partially—with my opinion you might use this letter to start a discussion on the subject in the columns of *The Illuminating Engineer*. I believe it to be the most suitable periodical for this purpose as the I.C.I. does not dispose of an organ of its own except the Proceedings, which will hardly appear in time for next year's session.

It was not possible to present these criticisms, which I make in a constructive spirit, during the last session. Scarcely any time was available, even for the discussion of some of the important papers presented. Moreover I hardly feel that at such a moment, being impressed by many of the successful features of this gathering, I would have been able to analyse exactly my feeling of dissatisfaction regarding certain aspects of the session.

It may be that the sharp contrast betwen a rainy Sunday and the preceding days of brightness was partly responsible for my strong feeling that, in order to make the next meeting a big success, some alterations in the scheme of operations of the International Illumination Commission, and of the session itself, are badly needed. The task of reporting on certain definite subjects has now been transferred from certain international committees, which never can meet between the sessions, to various national committees. This might appear to be a step in the right direction, but the plan is not likely to answer well.

One of the delegates at the first meeting pointed out that the work of the I.C.I. was developing in two directions since the 1924 session at Geneva. To the work of the international standardization (e.g., on the unit of light and its reproduction by a black body, on definitions, symbols and nomenclature, etc.), which can only be dealt with by committees of delegates from the national committees, there has been added the presentation and discussion of papers of a more general character illustrating progress in illumination.

The present official form of organization of the International Illumination Commission is less suitable for dealing with such matters than a congress with different sectional meetings, which can be attended by anyone who is interested in the subject without his having any official status.

It would be highly desirable, in my opinion, to combine these two organizations, starting with committee meetings on subjects of international standardization and agreement and subsequently—say two days afterwards—continuing the meetings as an International Congress on Illuminating Engineering. The rapid progress of illuminating engineering and the large number of subjects deserving discussion render it desirable to have such meetings at intervals of at least every two years, instead of three. Alternative meetings, one being held during the summer at some pleasure resort such as Bellagio and the next one during the winter in the capital so that practical examples of lighting may be seen, would reduce the interval between such congresses to one and a half years.

It is a matter for discussion whether, for the objects of the International Committee, the present interval of three years is not too long. The natural result from such a reorganization would be that fewer subjects be treated at one meeting. But they could be dealt with more thoroughly. For example, if street lighting were the subject of such a congress-meeting, it would not mean that all delegates would meet together to discuss the establishment of international street-lighting specifications. Such discussion would form the work of the committee proper, but it should be preceded by a full and well-prepared discussion on street lighting from its various aspects. Such subjects are commonly discussed at meetings of the Illuminating Engineering Societies in the various countries. Therefore the special feature of such congresses as described above would be the *international* exchange of experience, and on these occasions only original papers of a high order of merit should be presented.

Without entering into detail I cannot help stating that, in my opinion, this high standing was not attained in all papers at the Bellagio meeting. I do not mean to underestimate the importance of such papers as those presented by Professor Janet, Mr. Bordoni, etc., but there were other contributions which certainly would not have passed the scrutinizing examination by a committee on papers if such had existed. The serious inconvenience caused by the fact that some papers could not be studied before the meeting was sufficiently pointed out at the conference; but I should like to add my regret that several speakers were not able to give a short, concise abstract of their contributions such as would serve to give a general idea of their contents to those who were not able to study the papers beforehand.

I now come to my last complaint, which, I understand, was shared by many of those present at Bellagio. The interpreters for the three languages used at the meetings (viz., French, English and German) failed as soon as matters of technical detail were discussed. Unimportant generalities could be understood, but essential technical points could hardly be grasped. Translating papers and discussions always causes considerable delay, and the personality of the speakers is usually lost in the process of translating; but, at least, efforts should be made to compensate for this loss of time by rendering the translations as perfect as possible. In my opinion good translating can only be done by persons having a full knowledge of the subject, which was proved by the fact that sometimes an appeal had to be made by the delegates themselves for translations. Such points are important enough to receive full consideration at forthcoming meetings. I cannot help thinking that the success of the work of the International Illumination Commission in the future will largely depend thereon.

I am, dear Sir,
Yours very sincerely,
OBSERVER.

Bellagio, September 4th, 1927.

Obituary

SIDNEY RENTELL.

As we go to press we learn with great regret of the death of Mr. Sidney Rentell, for many years associated with the publishing firm of S. Rentell & Co., and editor of *Electricity*. Mr. Rentell was very widely known amongst technical journalists. He was a keen member of the Circle of Scientific, Technical and Trade Journalists, in whose discussions he frequently took part. He took a lofty view of the duties of an editor, and he was always interested in any project for raising the status of technical journalism. His kindly and genial personality gained him many friends. As a journalist he was invariably enthusiastic, with a wide outlook and an unusually broad knowledge of technical subjects. It was characteristic that he, from the very first, took a sympathetic interest in illuminating engineering; accounts of meetings of the Society and notes on developments in lighting have always been welcomed by *Electricity*, which has invariably taken a wide-minded view of the subject. His loss will be keenly regretted by a wide circle of friends, both in the electrical industry and in the journalistic world.

TRADE NOTES & ANNOUNCEMENTS

THE NEW BENJAMIN CATALOGUE.

An Imposing Production.

The new Benjamin catalogue (" Benjamin Correct Lighting Equipment," List 1,000) appears this year in a special extended form, and is an imposing production containing over 70 pages. The cover is in stiff brown paper, contrasting admirably with the light-green bordering of the inside pages, the subject matter of which, in black on art paper, is excellently printed and arranged.

The list now contains a great variety of units suitable for factories, offices, stores, etc. A novel and useful addition to this catalogue is the " Multum in Parvo " reference schedule, which appears immediately inside the front cover page. This eight-page leaflet contains illustrations of practically all Benjamin units, arranged in classes, with a polar diagram under each, showing approximately the distribution of light. In a vertical column the sizes of lamps recommended for each unit are presented—a welcome step which should help to avoid the bad practice on the part of some consumers of using sizes and shapes of lamps for which reflectors were never intended. The units are arranged in distinct classes, such as the Bencolite, Benjamin Industrial and Heavy-gauge Steel Reflectors, Shop-window Reflectors, Weatherproof Lanterns, etc. This leaflet inset shows at a glance all the main types of Benjamin units—and to some it may come as a surprise to find how varied and extensive the series has become.

The Benjamin R-L-M " One Piece " Reflector, with detachable flange and all-porcelain lampholder.

Turning next to the catalogue proper, we start with an introduction emphasizing the importance of good lighting and offering service in the form of technical advice to consumers, consulting engineers or architects. The value of good illumination as an industrial and commercial necessity is illustrated by several examples.

Probably the most striking advance in the types of reflectors shown is the " One Piece " R-L-M Reflector illustrated above. It will be recalled that this unit was exhibited at the recent conference in Brighton arranged by the Institution of Public Lighting Engineers.* The reflector is made of a single piece of metal. The advantages of avoiding any joint are evident—especially in the case of reflectors intended for outdoor use, where, sooner or later, the penetration of moisture through overlapping metal surfaces is liable to give trouble. The reflector is also designed to comply completely with the B.E.S.A. Specification for Industrial Reflectors, having an angle of " cut-off " of 20°. The illustration above shows one type of this unit, complete with detachable flange and all-porcelain holder.

The next section deals with the Benjamin Biflectors, the chief characteristic of which is the use of a diffusing ring, which enables elimination of glare to be combined with a highly extensive form of light distribution. Next there is a variety of elliptical angle reflectors, designed for the even illumination of vertical surfaces (hoardings, etc.), parabolic reflectors and local units. In the Rodalux unit (illustrated in our last number) we have an ingenious fitting, with a distribution of light specially suitable for the illumination of long, narrow corridors, streets, platforms, carriage drives, etc.; daylight units, comprising a steel reflector directing light through a disc of daylight glass, are also shown.

The remainder of the catalogue is devoted mainly to the Bencolite section (specially reproduced in colour), shop-window and showcase reflectors, weatherproof lanterns and various accessories.

On each page notes on light distribution, correct spacing, etc., are presented for each form of unit, and throughout the catalogue there is an excellent series of photographs of installations, all taken by artificial light and showing the application of the various lighting units in practice. Many of these pictures are excellent examples of the art of night photography. We reproduce elsewhere in this issue several typical views.

The final section containing technical data is exceptionally complete. The essentials of good lighting are briefly stated, tables of intensities are furnished, and charts to facilitate planning installations are presented. The lists of definitions of terms used in illumination and photometry is quite up to date, being reproduced from the British Standard Glossary. We hope that other firms in the lighting industry will adopt the same practice, as it is most desirable that these standard definitions should become widely known and universally applied in this country.

We have dealt with this catalogue exceptionally fully, because it furnishes a good example of the great advances made in literature on illumination during recent years. A comparison with similar data issued even 10 or 15 years ago will show how the technical standard of production has improved, and how very much greater is the variety of lighting units now available.

WELSBACH LIGHT CO. LTD.

Opening of New Depot at Leeds.

An interesting event on September 26th, briefly noted in our last issue, was the opening of the new " Welsbach House," at 46, Park Place, Leeds. The ceremony, which was performed by Mr. J. R. Yates, the Chairman of the Company, marks a further stage in the development of the business conducted in Leeds for some 30 years. The site was taken over three years ago, but the building was, most unfortunately, almost destroyed by fire in October last. Now, just a year later, it has once more been completed.

The new building has an imposing frontage to Park Place and a rear goods entrance from York Place. It comprises a basement and five floors. On entering the building one is struck by the imposing trade counter. The showroom, reached by an ornamental staircase, is on the first floor, and affords every opportunity for trade customers (only wholesale trade is done) to see all the latest developments in lighting appliances. The other three floors above the showroom are devoted to the storage of the Company's specialities, everything being arranged in the most orderly manner.

It is interesting to recall that, almost from the start of their activities, the Welsbach Light Co. Ltd. was associated with developments in the West Riding district of Yorkshire. The fact that the company is interested in lighting by gas, oil and electricity has no doubt been a distinct advantage in this important industrial area.

Mr. Yates's opening address was followed by remarks from several speakers, including Mr. C. S. Shapley, Manager of the Leeds Corporation Gas Department; the Chairman of this department (Mr. E. Clarke) and the Deputy Chairman (Alderman Geo. Ratcliffe) attended. Others present included Mr. H. Talbot, the General Manager of the Welsbach Company; Mr. A. R. Barford, the Leeds Depot Manager; and Mr. Reginald H. Palmer,

* *The Illuminating Engineer*, October, 1927, p. 289.

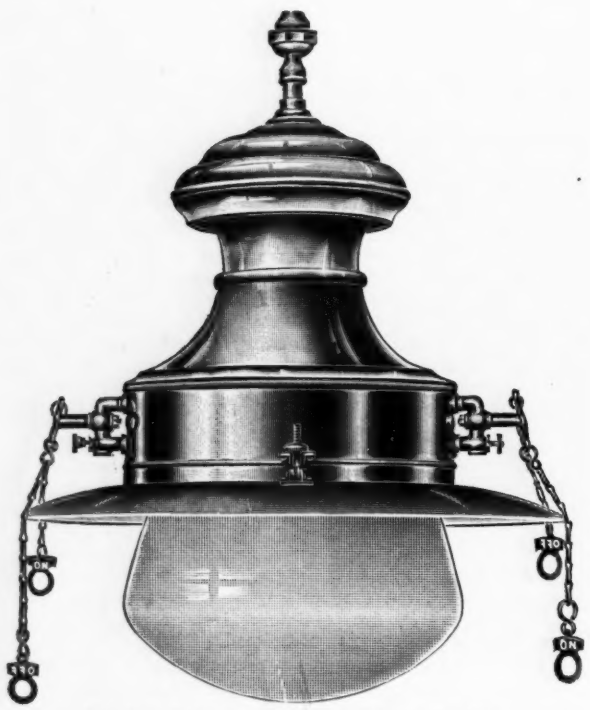
MET-VICK-RAY REFLECTORS.

We have received a leaflet illustrating the "Met-Vick-Ray" reflector, which is of the aluminium type and is designed to accommodate Cosmos 100- or 150-watt gasfilled lamps. The exterior is in a mat finish and the interior is highly polished, with a specially designed reflecting surface, one feature of which is the presence of a series of ring corrugations designed to diffuse the light. The canopy is provided with a special easily fixed attachment to enable the focussing position to be adjusted, and the reflector can be readily fitted with colour screens. No gallery is required and the general design is very simple, there being no loose parts.

THE PODMORE WHITE-WAY GAS LAMP.

It will be recalled that in the description of the exhibits at the Conference of the Institution of Public Lighting Engineers, recently held in Brighton, reference was made to the new Podmore White-Way Lamp, which is of pleasing design and gives a very soft effect. Owing to the diffusing properties of the globe one can look at it without being unduly conscious of glare, even though, in the electric form, the maximum candle-power is estimated to be about 3,000.

It was mentioned that this unit would shortly be developed for gaslighting, and in a recent visit to the showrooms of the firm in Charles Street we had an opportunity of seeing one of these lamps, which is shown in the accompanying illustration. This lamp is equipped with seven inverted superheated burners, and the light is controllable, either three, five or seven mantles being used, as desired.



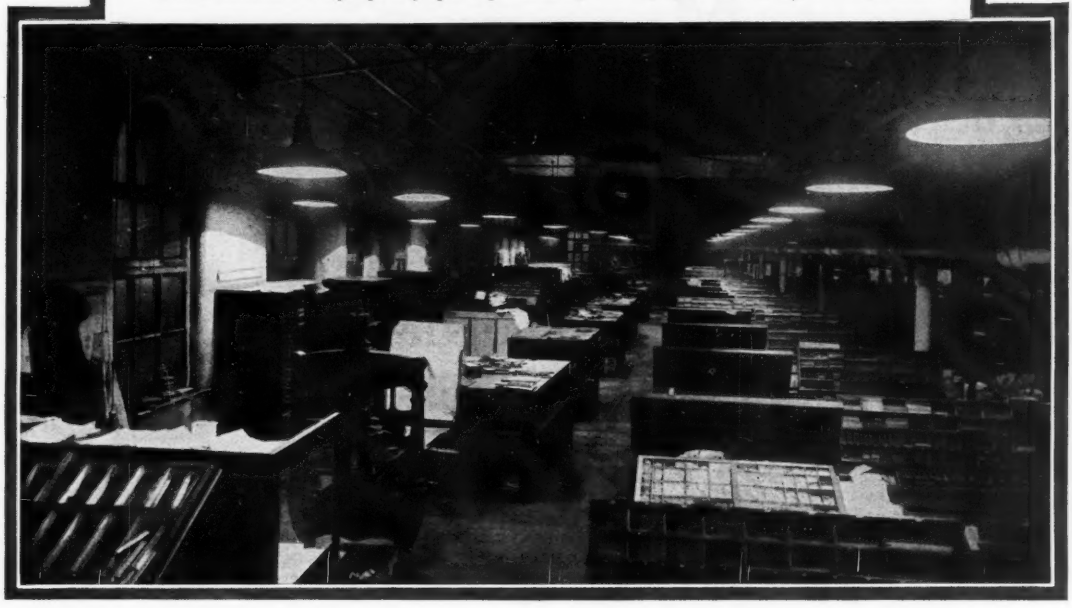
The New Podmore "White-Way" Lamp for Gas.

On this occasion the lamp was equipped with a diffusing globe of slightly pinkish coloration. The effect was quite interesting. At a casual glance the quality of light appeared practically identical with that of a vacuum electric incandescent lamp. The somewhat mellow yellow light secured by this combination appears to have advantages in certain cases, e.g., in interiors where it is desired to show up red colours well. It should, for example, be acceptable in a butcher's shop, where, as is well known, the colour of the illuminant is of importance owing to its effect on the appearance of the meat displayed.

During our visit we were also shown a photograph of a very large bronze globe, which is now on its way to India, where it will form the summit of a dome of a large building, surmounted by a weathercock. We were also shown some very pleasing examples of metal repoussé work for use in churches, and we understand that the firm of A. E. Podmore & Co. are making a feature of special designs of this character. In many installations there are certainly opportunities for a firm that is able to design special things expeditiously and at a reasonable cost.

These pictures give an excellent "before" and "after" effect of a printer's composing room. The camera portrays waste of light and inefficiency of the bare lamps or lamps with conical shades, and (below) shows the same room with an installation of scientifically designed reflectors, in short, Benjamin R-L-M, which ensure the lamps giving the maximum illumination in the right place.

Actual unretouched night photographs reproduced by courtesy of Messrs. Petty & Son, Leeds.



BEFORE AND AFTER—AN EFFECTIVE COMPARISON.

We have often emphasized the value of good photographs of lighting installations in appealing to the consumer. An effective illustration may do more than pages of description. It is, however, essential that the photographs should be taken entirely by artificial light, so as to depict, as nearly as possible, the actual lighting conditions.

The above pictures are two out of many effective illustrations in the new Benjamin catalogue, a review of which appears on p. 323. They are headed : " Does 50 per cent. of *your* lighting go to waste? " There should be little difficulty in deciding that a great part of the light *does* go to waste in the original installation shown in the upper photograph. The sources are unscreened, and a great part of the light merely dazzles the eyes of operators, and thus does actual harm. The illumination on the frames is feeble, and the lower part of the room is left in obscurity.

There can be no question of the greatly improved conditions shown in the lower photograph. The sources are now shielded by properly designed reflectors, directing the light downwards and brightly illuminating the surfaces of the frames. It will also be noted that whereas, in the upper photograph, the sides of the cases and the drawers are in shadow, in the new installation they, too, receive light—a point that deserves attention in the treatment of composing rooms.

The page facing these two illustrations in the Benjamin catalogue emphasizes the important part played by good illumination in diminishing accidents and improving production. In one typical case the cost of maintaining a new and improved lighting system was 48 per cent. greater than for the original one. But calculation shows that an increase of only 1 per cent. in production would offset this extra cost; the actual increase in production was estimated to be of the order of 25 per cent.

FLOODLIGHTING IN LIVERPOOL.

A special feature of the arrangements during Liverpool's recent week of Civic Celebrations was the spectacular lighting of some of the principal buildings.

St. George's Hall (Fig. 1) is the largest island building in the country. The idea of floodlighting this large building during the Civic Week occurred to the City Electrical Engineer (Mr. H. Dickinson), who enlisted the aid of the British Thomson-Houston Co. Ltd. As is usual in such cases, there were some difficulties to be overcome. The Lime Street front of the building, seen in Fig. 1, had become blackened with age. It was also found necessary (owing to the plateau in front of the hall being required for various functions) to place the projectors at a much greater distance than was really desirable. Moreover, owing to this area being so constantly used by crowds of people, it was obviously impracticable to station the projectors on the ground. Ultimately this frontage, which is approximately 400 feet in length, was floodlighted by 80 B.T.-H. type 786 projectors, arranged in batteries, on the roof of the L.M. & S. Hotel. Each projector was equipped with a 1,000-watt gasfilled lamp. It was not considered desirable to flood this entire frontage with light, as the appearance of the building would then have been unduly flat; in order to gain some relief, reflectors equipped with 500-watt gasfilled lamps were placed under the colonnades.

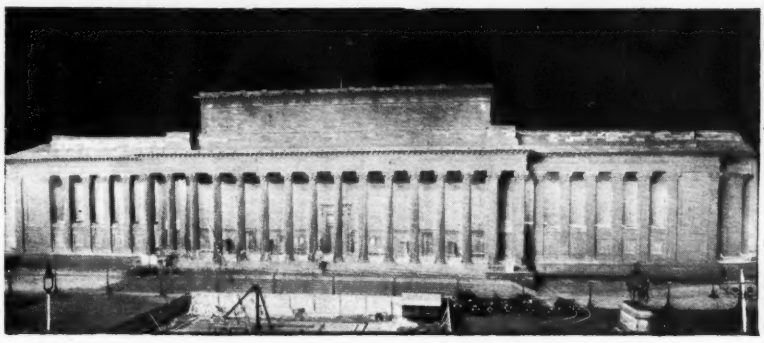


FIG. 1.—Showing Floodlighting of St. George's Hall, Liverpool, during Civic Week, by means of 188 B.T.-H. Floodlight Projectors.

Considering that the greater part of the surface is dead black, and the long throw of the projectors, the effect, as shown in Figs. 1-3, must be considered very fine. Evening after evening at least 20,000 people assembled to await the switching on of the lighting.

Another floodlighted building which attracted much attention was that of the Cunard Steamship Company, Ltd., at Pier Head. This building (Fig. 4) was illuminated by means of thirty B.T.-H. 485 floodlight projectors, each equipped with 1,000-watt Mazda projector-type lamps, arranged in two batteries, and erected on low platforms close to and in front of the building.

The surface of the building is of rough stone, deeply chiselled and having a mottled appearance. One prominent feature of the building is the projecting entrance porch. This architectural feature was emphasized by the interior illumination of the entrance by means of one B.T.-H. type 793 projector, equipped with a 500-watt lamp fixed in front of one of the columns forming the entrance.

The floodlighted Cunard building could be seen at night for a great distance down the river and attracted much attention. These two installations are examples of what can be done with floodlighting on special festive occasions.

It may be expected that in coming years it will be more widely and generally applied to buildings, and will contribute greatly to the appearance of cities by night. On this occasion there can be no doubt that the floodlighting display formed one of the most impressive features of the civic celebrations at Liverpool, which appear to have been a great success. We understand that all the illustrations are from untouched night photographs, and therefore give a good idea of the actual appearance of the buildings when floodlighted.

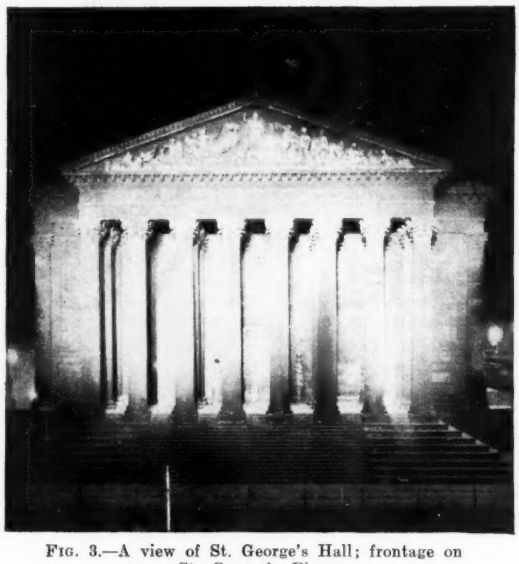


FIG. 3.—A view of St. George's Hall; frontage on St. George's Place.

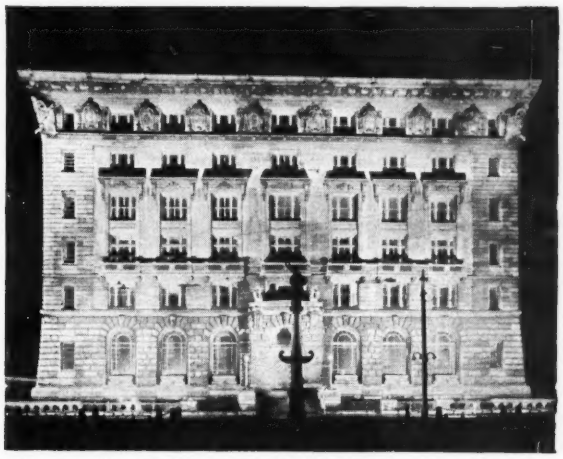


FIG. 4.—Showing the Cunard Building at Liverpool floodlighted by B.T.-H. Projectors.

Floodlighting has, of course, many other applications. The above description illustrates its application to buildings. But it can also be used effectively in parks and gardens for the illumination of the foliage of trees, flower gardens, etc. A good instance of its use in this way was afforded by the coloured floodlighting of trees at the British Empire Exhibition at Wembley. For this purpose 44 B.T.-H. projectors, each equipped with a 500-watt Mazda projector gasfilled lamp, were used. Advantage might well be taken of these possibilities by organizers of carnivals, fêtes, etc., and also by those responsible for exhibitions in which lighting should play an important part.

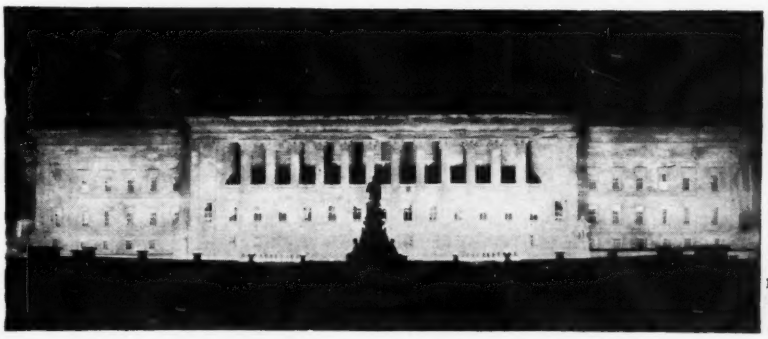


FIG. 2.—Another view of St. George's Hall, taken in St. John's Gardens.

See Note on p. 324 in this issue.

A VISIT TO THE SHOWROOMS OF MESSRS. WM. SUGG & CO. LTD.

The writer recently had the opportunity of paying a visit to the showrooms of Messrs. Wm. Sugg & Co. Ltd., in Chapter Street, and also to the works in Regency Street, Westminster, and was much impressed by the signs of activity and progress. As is well known, the firm of Messrs. Wm. Sugg & Co. is one of very old standing. It was associated with much of the early pioneering work in gaslighting. Thus additions to the works have been made from time to time, until they now occupy a considerable area, and are equipped to deal with practically any operation involved in the production of modern gaslighting and heating apparatus. Specially interesting was the ingenious automatic machinery by which burner parts are turned out. It would have required a much longer time than was possible to get any adequate idea of the complete scope of this factory. But one got a glimpse of the manufacture, both of standard articles turned out by mass production and of examples of beautiful special fittings, of which the firm have made a feature.

FIG. 1.—A General View of the Main Showroom at Chapter Street, Westminster.

The showroom at Chapter Street has been considerably extended since the writer's last visit. In the basement there is an area set apart chiefly for the display of street-lighting fittings. But it is the main showroom, a view of which is seen in Fig. 1, that chiefly commands attention. The chief impression one receives is one of space. This large room is not overcrowded; yet it contains specimens of many varied and interesting fittings. The first thing that strikes the eye is the imposing ornamental fireplace seen in the background. The whole of this part of the room furnishes an admirable setting to the decorative lighting fittings on view. All these fittings are controlled by the aid of Messrs. Sugg & Sugg's well-known device for distant lighting. A very effective method applied to a number of units was the exhibition side by side of types almost identical in appearance—but one lighted by gas and the other by electricity. The resemblance was extended to the control, the switch operating the gas unit being executed in almost exactly the same style as the ordinary electric tumbler switch. One could scarcely find a better practical demonstration of the fact that practically all the varieties of electrical fittings for ordinary internal use can be duplicated for gas lighting. This method was applied to the very pleasing "Baby" Flambeau unit (Fig. 4), the gas and electric units being arranged one on each side of the fireplace.

Naturally, all the typical Sugg fittings for domestic lighting were represented. The designs of semi-indirect bowl fittings, also following lines similar to those commonly adopted for electric lighting, had a fine appearance, as well as giving a soft, diffused light. One noticed incidentally several examples of the special designs in which the firm excels, notably a very fine pedestal unit of ornamental design.

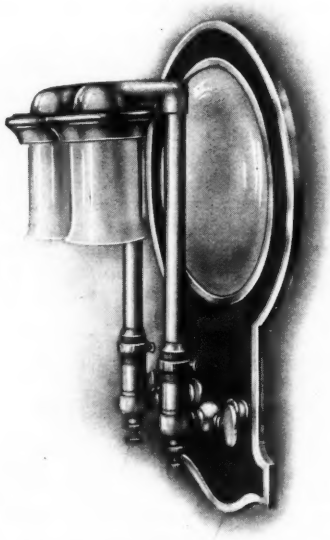


FIG. 2.—The Double "Elite" Inverted Burner.

The other units we have selected for illustration are also examples of specialities. The double "Elite" inverted burner (Fig. 2) is now very familiar, and is a particularly neat design, features being the pleasant light yielded by the mantles equipped with Vitreosil cylinders, and the extreme ease with which the whole can be dismounted and assembled. In Fig. 3 we have another special unit, the "Directive" fitting, with an adjustable aluminium reflector, which enables a strong beam to be cast in any direction. Yet another unit deserving mention is the "Belvedere" (Fig. 5), which utilizes a white enamelled ring round the burner, so as to screen it completely from the eyes of workers.

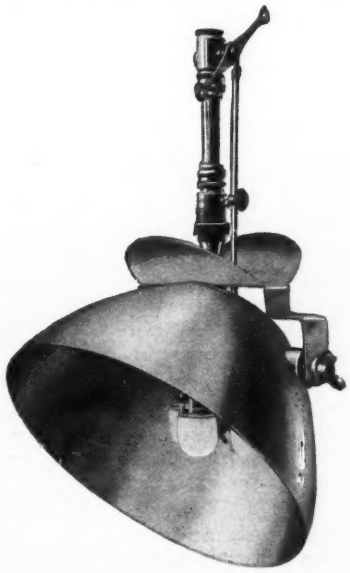


FIG. 3.—The "Directive" Unit, with Adjustable Aluminium Reflector.

In the basement showroom typical street lighting fittings were on view. We had also an opportunity of examining more closely some of the luminous traffic devices which the firm has just recently introduced, and which were described in our last issue, in connection with the account of exhibits at the Conference of the Institution of Public Lighting Engineers at Brighton.* The design of such devices really forms quite a new chapter in illuminating engineering; it is interesting to observe that Messrs. Wm. Sugg & Co. Ltd., who did so much original work in this field in the past century, are once more acting as pioneers.

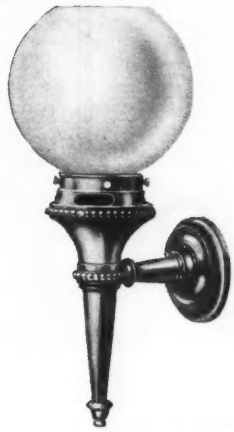


FIG. 4.—The "Baby" Flambeau Unit.

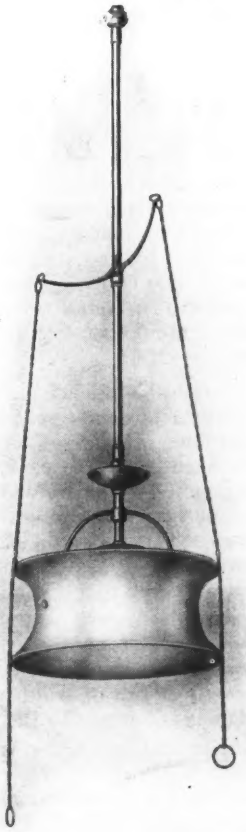


FIG. 5.—The "Belvedere" Unit.

* *The Illum. Engineer*, October, 1927, p. 292.

Recent Developments in Shop-Window Lighting

Lectures and demonstrations on the above subject took place in the Demonstration Theatre of Holophane Ltd. on August 30th. Mr. L. M. Tye, in his address on "Modern Shop Lighting," pointed out the great drawing power of a well-lighted shop window, which represented one of the cheapest forms of advertising. Many of the best-known stores in London and in the provinces are now well lighted, but unscientific methods, such as the use of bare lamps without appropriate screening, are still frequent in retail shops. When this practice is adopted quite 60 per cent. of the available light may be wasted.

The general tendency now is to make an attractive display of representative goods, rather than to make the windows serve as a catalogue. Successful results depend greatly on the choice and arrangements of the lighting units. The lecturer illustrated a considerable variety of Holophane reflectors, specially designed for windows of various kinds. It was shown, by the aid of lantern slides, how different devices may be adopted according to the nature of the goods displayed.

As regards intensity of illumination, much depends on the character of the district. Gasfilled 100-watt lamps are now very widely used. From one to two-and-a-quarter feet run of window may be allowed per 100-watt lamp, according to the locality.

A subsequent lecture by Mr. R. Gillespie Williams, on "Colour Lighting of Shop Windows and Interiors," included many effective demonstrations of the effects of coloured light. It was shown, for example, how, by altering the colour of the light, decorative patterns may be entirely changed in appearance—a principle which naturally has a considerable bearing on the use of colour-lighting for different classes of goods.

North-East Coast Lighting Service Bureau

As we go to press we receive particulars of the forthcoming activities of the North-East Coast Lighting Service Bureau. Mr. E. S. Evans, the District Engineer, has recently lectured before the National Association of Schoolmasters and a number of Rotary Clubs, at Durham, Darlington, North Shields and elsewhere. There are further lectures in prospect to the Newcastle-on-Tyne Advertising Club, the Sunderland Publicity Study Club, the North-East Coast Power Consumers, and the West Hartlepool Chamber of Trade. It may also be recalled that the first E.D.A. Conference was addressed by Mr. Beauchamp on the C.E.D.A.C. Campaign at the Bureau on October 26th.

Stage Lighting at the Albert Hall

We have received some particulars of the installation carried out at the Royal Albert Hall by the Strand Electric and Engineering Co. Ltd., in connection with the performance of the opera "Mozart and Salieri." The use of the Albert Hall for such performances is an enterprising step, which involved special lighting arrangements, chiefly owing to the absence of footlights. We shall be referring to this novel system of lighting in our next issue.

Exhibition of Light and Heat in Medicine Surgery and Hygiene

Readers will doubtless be interested in the above exhibition, which is being held in the Central Hall, Westminster, during December 13th to 16th. No doubt applications of "artificial sunlight" will be fully illustrated, and we understand that a paper dealing with hygienic aspects of illumination, by Mr. J. W. T. Walsh, will be included in the proceedings.

REVIEWS OF BOOKS AND PUBLICATIONS RECEIVED

EDISON: THE MAN AND HIS WORK; *by C. S. Bryan. (Alfred A. Knopf, London, 1927; pp. 304; 7s. 6d.)*

The fact of Edison having this year attained the ripe age of fourscore years has naturally led to the publication of many comments on his work. In this volume Mr. G. S. Bryan records many facts about Edison's career that are not generally known and presents much information ordinarily inaccessible to readers. Certainly the volume contains a vivid and entertaining picture of this original man, who stands out pre-eminently as one of the greatest inventors of the past century. One is first impressed by Edison's extraordinary capacity for work—for many years he seems to have laboured for nearly 20 hours a day—and his courage and indomitable perseverance. He was never a great scientist, in the usual sense of the word. His interests were mainly in the application of science. But he was capable of intense study of scientific knowledge in the pursuit of his aims.

One is next struck by his placid disregard of the ordinary worries of life and the philosophy that enabled him to triumph over apparently desperate circumstances. His early life was one of great hardship. Yet throughout there emerges a kind of impish humour and sense of enjoyment. To Edison discovery was essentially a joyous adventure.

The first part of the book is concerned with his early efforts in telegraphy. There are many curious items of information. We learn that at one time Bernard Shaw was an employee in the London office of the Edison Co. Perhaps the invention which did most to make Edison's name a household word was the "phonograph," initiated in 1877. To our readers his name is associated mainly with the invention of the electric incandescent lamp, his efforts being paralleled by those of Swan in this country. At that time the arc lamp was the only electrical illuminant. Its candle-power and consumption were obviously excessive for domestic purposes. Hence the problem presented itself as "the subdivision of the electric light"—a problem which many leading scientists of the day considered insoluble.

It is most interesting to read that Edison's avowed aim was to produce an electric illuminant which should be "an exact imitation of all done by gas," and accordingly he dived deep into existing literature on gas lighting. The first experiments were made with metal wires, but Edison soon reverted to carbon. The first approach to a practical lamp was one with a filament of carbonized sewing cotton. This actually burned for 40 hours! Later bamboo fibre appeared to be the best material for filaments, and was sought for by a series of agents in all parts of the world. The long time occupied by these researches exceeded the duration of many patents and involved great expenditure. Edison is reported to have stated that he never derived any benefit from lamp patents. But the concerns founded by him to develop electric incandescent lighting flourished greatly. In 1882 the Edison Electric Illuminating Co. of New York were lighting 400 lamps and supplying current to a mere handful of consumers. In 1922, 40 years later, the company was operating nearly 10,000,000 lamps and supplying over 300,000 consumers!

Edison was associated with many other inventions, electric batteries, dead-beat galvanometers, electric pens used for duplicating manuscripts, typewriters, etc. He ultimately became President of the Naval Consulting Board. In conjunction with Mr. W. J. Hammer he did much work on fluorescence, and also applied himself to X-ray problems.

In connection with his researches in the latter field we cannot resist quoting one delightful letter from a correspondent who desired to apply X-rays "for ways that are dark and for tricks that are vain":—

"Dear Sir,—I write to know if you can make me an X-ray apparatus for playing against faro bank. I would like to have it so I can wear it on my body, and have it attached to spectacles or goggles so I can tell the second card of a deck of playing cards turned face up. If you will make it for me, let me know what it will cost. If I make a success out of it I will pay you five thousand dollars extra in one year. Please keep this to yourself. If you cannot make it, will you be kind enough to give me Professor Roentgen's address?"

INDEX (November, 1927).

Developments in Vita Glass

During a recent visit to Restlight Ltd. the writer was informed that considerable progress is being made with this system of lighting, one interesting item of news being that one of the model houses at the Ideal Home Exhibition next year is to be furnished with illumination from artificial skylights composed of Restlight glass with lamps behind—thus carrying still further the imitation of sunlight. This house is also to be equipped with Vita Glass windows, with the object of promoting free access of the ultra-violet rays in sunlight.

Some particulars are now available of the experiments being made at Kew Gardens on the effect of using Vita Glass for greenhouses, frames, etc. Results so far appear encouraging. Two boxes, each containing six lettuces, were sown on the same day beneath ordinary and Vita Glass. They were tended in exactly the same manner and were plucked on the same day six weeks later. Those grown under Vita Glass were a deeper shade of green and much sturdier, the total weight of the plants being 9¾ lbs. compared with 8½ lbs. Experience shows that most plants grown under Vita Glass show greater strength and that leaves and blossoms are of a deeper blue.

According to information received, the use of Vita Glass for large new buildings now being erected is making great strides, with the result that the cost of manufacture has now been considerably diminished. This should have a material influence on its use for horticulture, where large areas of glass are involved.

Why We Should Retain the Lighting Load

At a recent meeting of the Midland (B.C.G.A.) Salesmen's Circles an address on the above subject was given by Mr. J. H. Duignan, Distribution Superintendent to the Kidderminster Gas Company.

Mr. Duignan pointed out that from the time of the earliest gasworks lighting had been the greatest asset, and even at the present time it constituted 50 per cent. of the output of small and medium-sized undertakings. Every effort should be made to retain the lighting load. There could be no question of sitting on the fence, feeling secure that there was enough to do with cooking, heating, etc. A few years ago the power load was considered secure. Was it so to-day?

In his opinion, good public lighting was the finest advertisement an undertaking could have. There was also still a large amount of business in shop lighting to be obtained, and though the consumption of churches, schools, etc., was not high it was well worth trying to retain this lighting for the moral effect of the advertisement.

Mr. Duignan presented figures to show what was being done in Kidderminster, where the lighting load was regarded as a vital portion of the business. They still retained the public lighting—the markets, the free library, four mills, the union workhouse (consuming 1½ million cubic feet per annum), several chapels, and all the schools except one.

He suggested that it was not good business to light a showroom with high-pressure gas if there were no high-pressure mains in the town to give consumers the same benefits. Low-pressure lamps and burners, fitted with superheaters, had reached such a standard of efficiency that little was to be gained by high-pressure lighting.